NAVSHIPS 0967-170-8010 *(Non-Registered)*

TECHNICAL MANUAL

for

TELEPRINTER SETS AN/UGC-38 and AN/UGC-40 and TELETYPEWRITER SET AN/UGC-41

Manufactured by
MITE Corporation
New Haven, Connecticut

DEPARTMENT OF THE NAVY
NAVAL ELECTRONIC SYSTEMS COMMAND

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Approved: 30 August 1966

LIST OF EFFECTIVE PAGES

PAGE NUMBERS	CHANGE IN EFFECT	PAGE NUMBERS	CHANGE IN EFFECT
Title Page	Original	4-1 to 4-26	Original
ii to xi	Original	5-1 to 5-140	Original
1-0 to 1-8	Original	A-1 to A-60	Original
2-1 to 2-12	Original	6-1 to 6-90	Original
3-1 to 3-10	Original	i-1 to i-4	Original

MITE CORPORATION .446 Blake Street, New Haven, Connecticut Contract: NOm 73340

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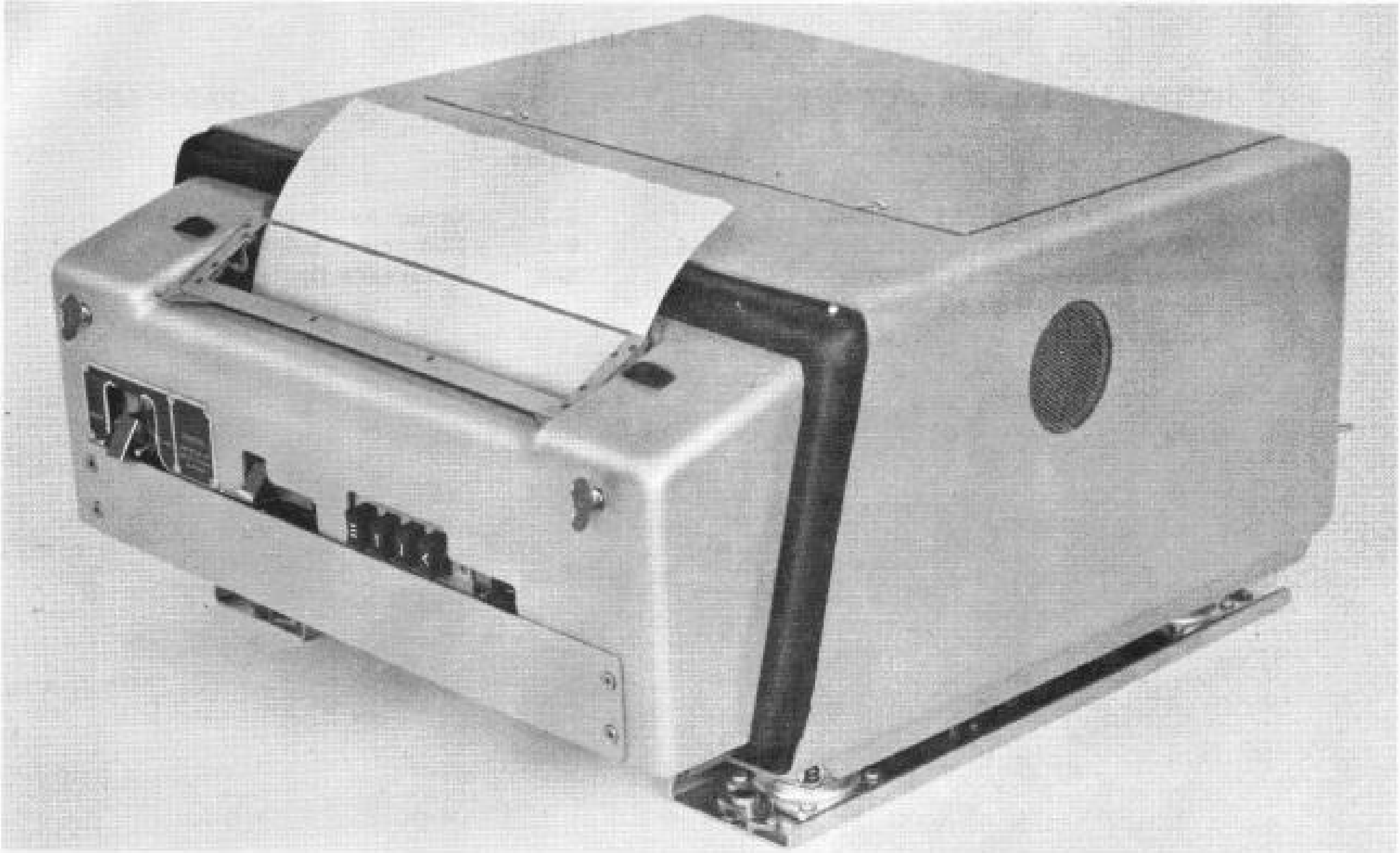
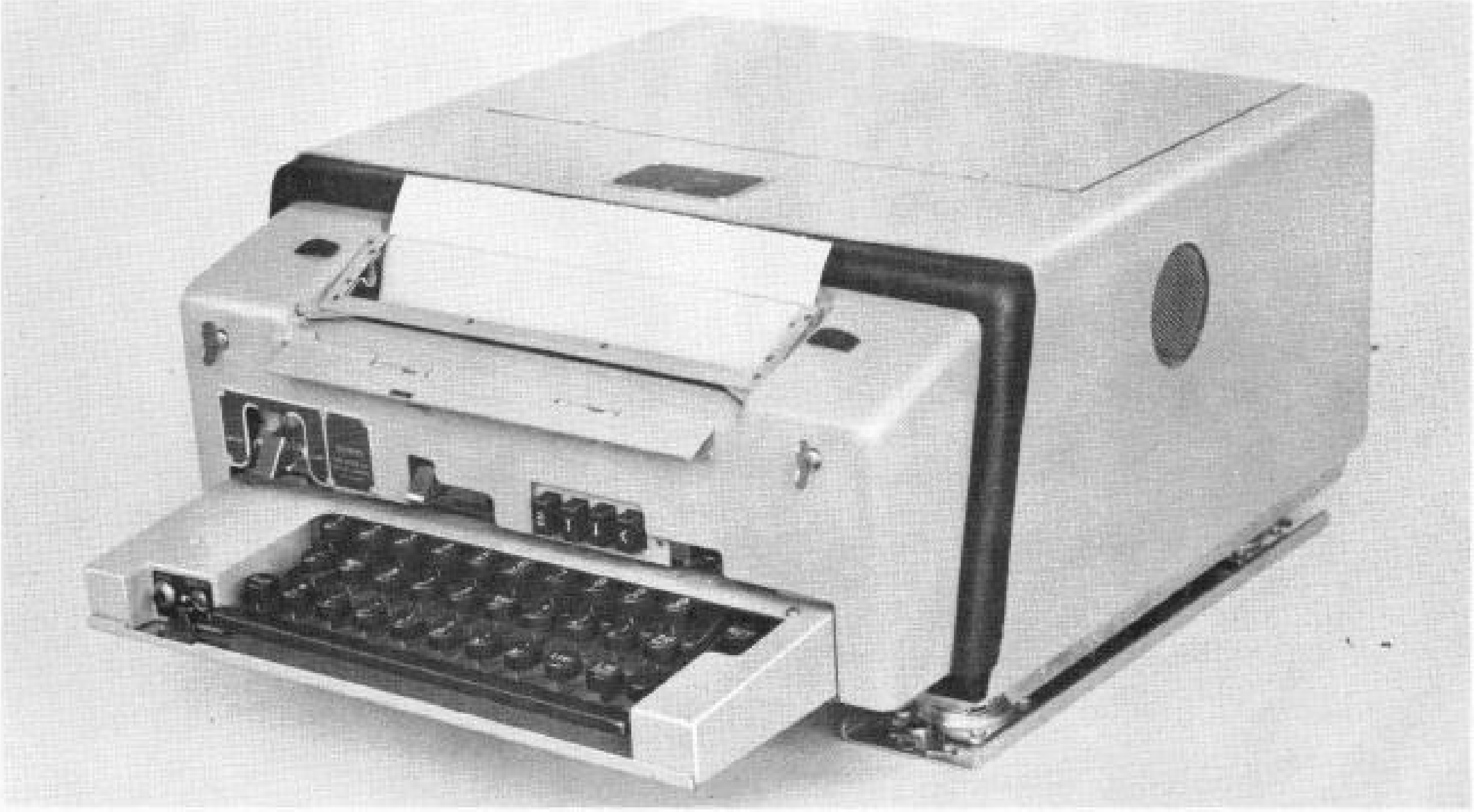


A. Teleprinters AN/UGC-38 and AN/UGC-40



B. Teletypewriter Set AN/UGC-41

Figure 1-1. Teleprinters AN/UGC-38 and AN/UGC-40, and Teletypewriter Set AN/UGC-41

SECTION 1

GENERAL INFORMATION

1-1. GENERAL.

This Technical Manual contains installation, operation, theory, troubleshooting, and maintenance instructions for Teletypewriter Set AN/UGC-41 (Send and Receive Communications Page Printer), Teleprinter AN/UGC-40 (Receive Communications Page Printer), Teleprinter AN/UGC-40 (Receive Only Communications Page Printer), and Teleprinter AN/UGC-38 (Receive Only Weather Page Printer). The teletypewriter set and teleprinters are manufactured by MITE Corporation, New Haven, Connecticut. Extracts from this publication may be made to facilitate the preparation of other Department of Defense Publications.

1-2. PURPOSE AND DESCRIPTION OF EQUIPMENT.

a. PURPOSE. - Teletypewriter Set AN/UGC-41 and Teleprinter Sets AN/UGC-40 and AN/UGC-38 are ruggedized, lightweight, miniature, alphanumeric or alpha-weather printing telegraph equipments. They may be used for general service under a wide range of operating conditions. These sets are fully compatible with commercial and military teletypewriter equipments employing the standard Baudot code and can be integrated into existing land-line and radio-link communications systems. By appropriate switching the equipment can be operated in full-duplex on-line, or off-line circuits. Local operation (off-line) as an electric typewriter is used for local testing. Since Teleprinter Sets AN/UGC-38 and AN/UGC-40 do not have keyboards, an external source for keying the units is required for local testing. As Figure 1-1 illustrates, the units are furnished in non-tactical cases for use in fixed-station, shipboard, mobile, and aircraft installations.

b. DESCRIPTION.

(1) OPERATING OPTIONS. - Teletypewriter Set AN/UGC-41 consists of a keyboard, a printer, an electrical chassis, an electronic module, and a case. The electronic module contains a dual range line sensor, a line sensor power supply, and a time delay motor stop. Teleprinter Sets AN/UGC-38 and AN/UGC-40 are essentially the same as Teletypewriter Set AN/UGC-41 except that they will not accept a keyboard. A 115-volt, 60 cycles per second, hysteresis-synchronous, alternating current, motor is provided for operation in each equipment. Case CY-6063/UG, equipped with shock-mounts, houses each of these units making them suitable for installations which may be subjected to severe shock or vibration. The versatility of these units is further enhanced by a simple switching option which permits operation in Hi- or Lo-level full-duplex, or off-line (local) modes. Speed change gears, allowing variations in operational speed, are supplied for 60, 66, and 100 words-per-minute operation.

(2) PRINCIPLES OF OPERATION. - Teletypewriter Set AN/UGC-41 is a send/receive unit. Teleprinter Sets AN/UGC-38 and AN/UGC-40 are receive-only units. Only that portion of the text relative to the receipt of coded signals is applicable to Teleprinter Sets AN/UGC-38 and AN/UGC-40. Teletypewriter Set AN/UGC-41 provides the means of transmitting and receiving printed intelligence comprising the 26 letters of the alphabet, the digits 0 through 9, and a basic group of punctuation signs and other symbols. (Teleprinter Set AN/UGC-38 is a receive-only printer with standard weather code print-out.)

In addition to the printing of these characters, certain necessary mechanical operations are provided; spacing between words, letters-figures shifting, line feed, and carriage return. Other operating features include a bell function; an automatic line feed upon receipt of signalled carriage return; a repeat key, which when depressed causes the last transmitted character to be continuously repeated until the key is released; an automatic time delay motor stop; and a keyboard interlock mechanism. When in use, the keyboard interlock mechanism enables the operator to depress any of the keyboard levers without actually transmitting the intended character. Upon receipt of a synchronous pulse, the keyboard clutch is released and the intelligence stored in the keyboard is transmitted, clearing the keyboard for depression of the next key lever.

At the other end of the line, the train of pulses (generated upon release of the keyboard clutch) is received and decoded by the line sensor in a remote teletypewriter set. The decoded train of pulses is then translated into the required mechanical action by the printer, resulting in either the printing of a character or the performance of a mechanical operation. For reception, the roles of the local and remote teletypewriter set are simply reversed. For off-line (local) operation the keyboard, line sensor power supply, line sensor, and printer of a teletypewriter set are connected in a closed loop. Teleprinter Sets AN/UGC-40 and AN/UGC-38 require a keying device for test purposes and to make those adjustments which require power. The signal code developed by the keyboard is the standard five-level 7.42 unit Baudot serial teletypewriter code. In this code, each keyboard function is represented by a discrete combination of mark (current) bits and space (no-current) bits. Each bit group contains five of these intelligence bits. The letter J, for example, is represented by mark-mark-space-mark-space. In addition to the five intelligence bits, each bit group begins with a start (spacing) bit and ends with a stop (marking) bit. The stop bit is 1.42 times as long as any of the other six bits, each of which may be considered as one time-unit long. The entire bit group consisting of a start bit, five intelligence bits, and a stop bit is therefore 7.42 units in length. The actual time duration of a bit group is dependent upon operational speed. At 60 words per minute, each bit is 22 milliseconds in length (7.42 times 22 milliseconds or 0.163 seconds per letter or function). The complete Baudot code is illustrated in Figure 1-2.

Although the keyboard operates on a 7.42 unit basis, the receiving printer operates on a 6.7 unit basis. This feature increases both the reliability and versatility of the teletypewriter set, allowing it to correct for slight variations in speed between machines.

(3) OPERATING FEATURES. - Teletyewriter Set AN/UGC-41 employs a standard teletypewriter keyboard which, when the set is to be shipped, is stowed in a recess in the electrical chassis beneath the printer. The keyboard can be illuminated by opening the hinged front cover reflector, which when opened, reflects light from the copy lamps on to the keyboard. The keyboard can thus be illuminated without having to illuminate the surrounding area. Intensity of the copy lights can be controlled by placing the copylight switch (see Figure 3-1 for all keyboard controls) in the BRIGHT, DIM, or OFF position. Figure 1-3 shows the equipment with the keyboard extended to, and secured in, the operating position. The 32 keys are arranged in three rows which are banked for operator comfort. Each of the keys on the keyboard (except FIGS, LTRS, LINE FEED, CAR RET, blank, and the space bar, which normally do not cause printing) serves a dual purpose. When the teletypewriter set is in the Figures condition the symbol shown on the upper portion of the depressed key will be printed. When the teletypewriter set is in the Letters condition the letter shown on the lower portion of the depressed key will be printed. The blank key at the lower right is one of the 32 available characters, but normally does not cause printing to take place. The keyboard is equipped with a guard to negate the possibility of damaging the space bar.

The four buttons located below the copy window (part of the chassis assembly), control the mechanically operated off-line functions of line feed, figures shift, letters shift, and carriage return. These are local functions and have no effect on the signal line.

The operating controls are grouped at the lower left side of the keyboard. The line feed shift arm, used to shift to single or double space copy, extends through the front cover just above the key lever for letter P. A PAPER pressure release button extends through the printer front cover just over the key lever for the letter W.

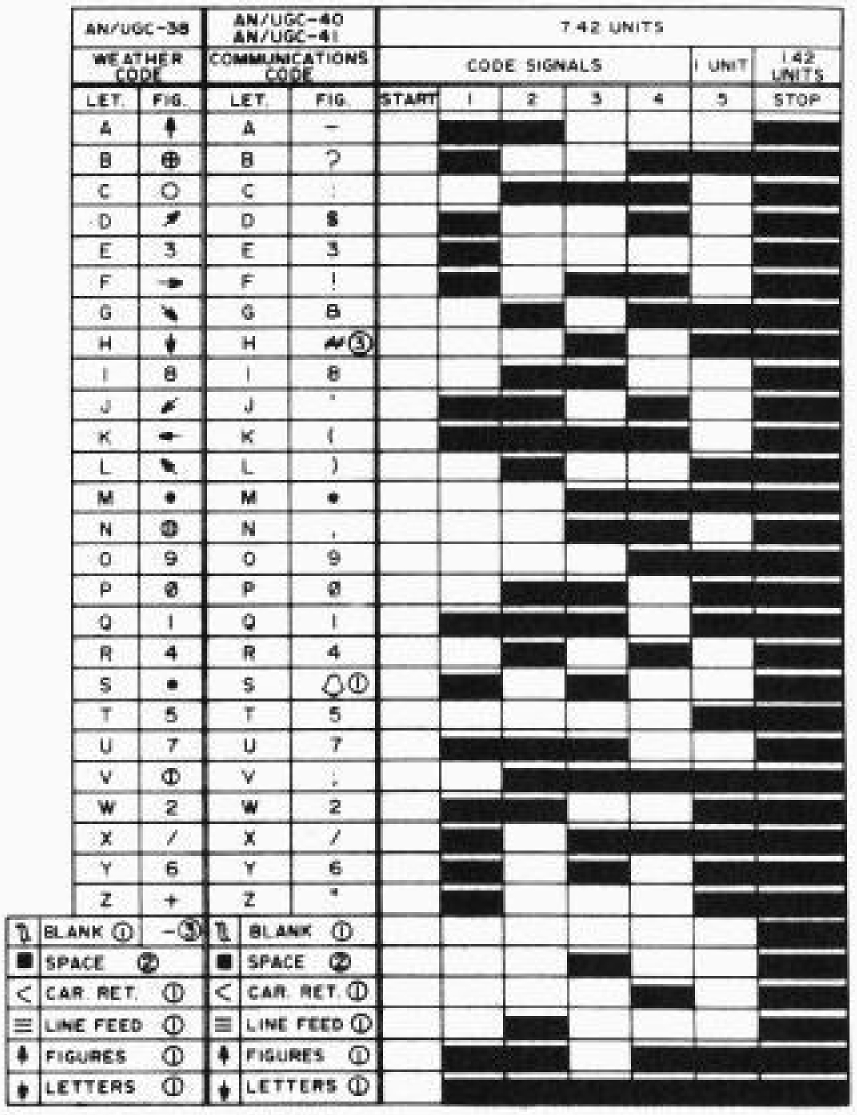
Each equipment is supplied with an electronic time delay motor stop which turns off the motor leaving the line sensor in a standby condition when no mark-to-space transition has been received for approximately two minutes. Receipt of the first mark-to-space transition automatically restarts the motor.

All three equipments, Teletypewriter Set AN/UGC-41 and Teleprinter Sets AN/UGC-40 and AN/UGC-38, use standard single- or multi-ply rolls of copy paper 8-1/2 inches wide and of any diameter up to 5 inches with a 1-inch hollow core. The paper roll is stored in the electrical chassis (Figure 1-4). The three equipments are also capable of using fanfold, sprocket feed, multi-ply copypaper, stored externally and fed into a slot in the rear of Non-Tactical Case CY-6063/UG.

The electrical chassis (Figure 1-5) accommodates the printer and the copypaper. The printer prints six lines to the inch, when set for single line-feed, and three lines to the inch, when set for double line-feed. Automatic carriage return and line-feed occur when either 72 or 76 characters (depending on the adjustment of the automatic carriage return mechanism) have been printed on a line and a carriage return signal has not been received. In addition, the unit also contains a device which, when enabled, provides automatic line-feed on signalled carriage return, preventing overprint of the previous line.

During operation of the printer, the copypaper feeds in front of an eight-sided print cylinder which contains 64 characters. This print cylinder is positioned so that the selected character is correctly located behind the paper. The print hammer then strikes the paper through a standard 1/2-inch Underwood-type inked ribbon, causing the character to be printed. Since the print cylinder never touches the ribbon, little cleaning of the print cylinder is required. Ribbon reversal is automatic.

The electronic module consists of the time delay motor stop, line sensor power supply and line sensor.



AN/UGC-38		AN/UGC-40 AN/UGC-41		7.42 UNITS						
WEATHER CODE		COMMUNICATIONS CODE		CODE SIGNALS					1 UNIT	1.42 UNITS
LET.	FIG.	LET.	FIG.	START	1	2	3	4	5	STOP
A	↑	A	−		■	■				■
B	⊕	B	?		■			■	■	■
C	○	C	:			■	■	■		■
D	↗	D	$		■			■		■
E	3	E	3		■					■
F	→	F	!		■		■	■		■
G	↘	G	&			■		■	■	■
H	↓	H	#③				■		■	■
I	8	I	8			■	■			■
J	↙	J	'		■	■		■		■
K	←	K	(		■	■	■	■		■
L	↖	L	)			■			■	■
M	●	M	.				■	■	■	■
N	⊘	N	,				■	■		■
O	9	O	9					■	■	■
P	0	P	0			■	■		■	■
Q	1	Q	1		■	■	■		■	■
R	4	R	4			■		■		■
S	●	S	🔔①		■		■			■
T	5	T	5						■	■
U	7	U	7		■	■	■			■
V	⦶	V	;			■	■	■	■	■
W	2	W	2		■	■			■	■
X	/	X	/		■		■	■	■	■
Y	6	Y	6		■		■		■	■
Z	+	Z	"		■				■	■
⇅ BLANK ①	−③	⇅ BLANK ①								■
■ SPACE ②		■ SPACE ②					■			■
< CAR. RET. ①		< CAR. RET. ①						■		■
≡ LINE FEED ①		≡ LINE FEED ①				■				■
↑ FIGURES ①		↑ FIGURES ①			■	■		■	■	■
↓ LETTERS ①		↓ LETTERS ①			■	■	■	■	■	■

① NON-PRINTING ; NON-ADVANCING
② NON-PRINTING ; ADVANCING
③ PRINTING ; ADVANCING

Figure 1-2. Five Level Baudot Code

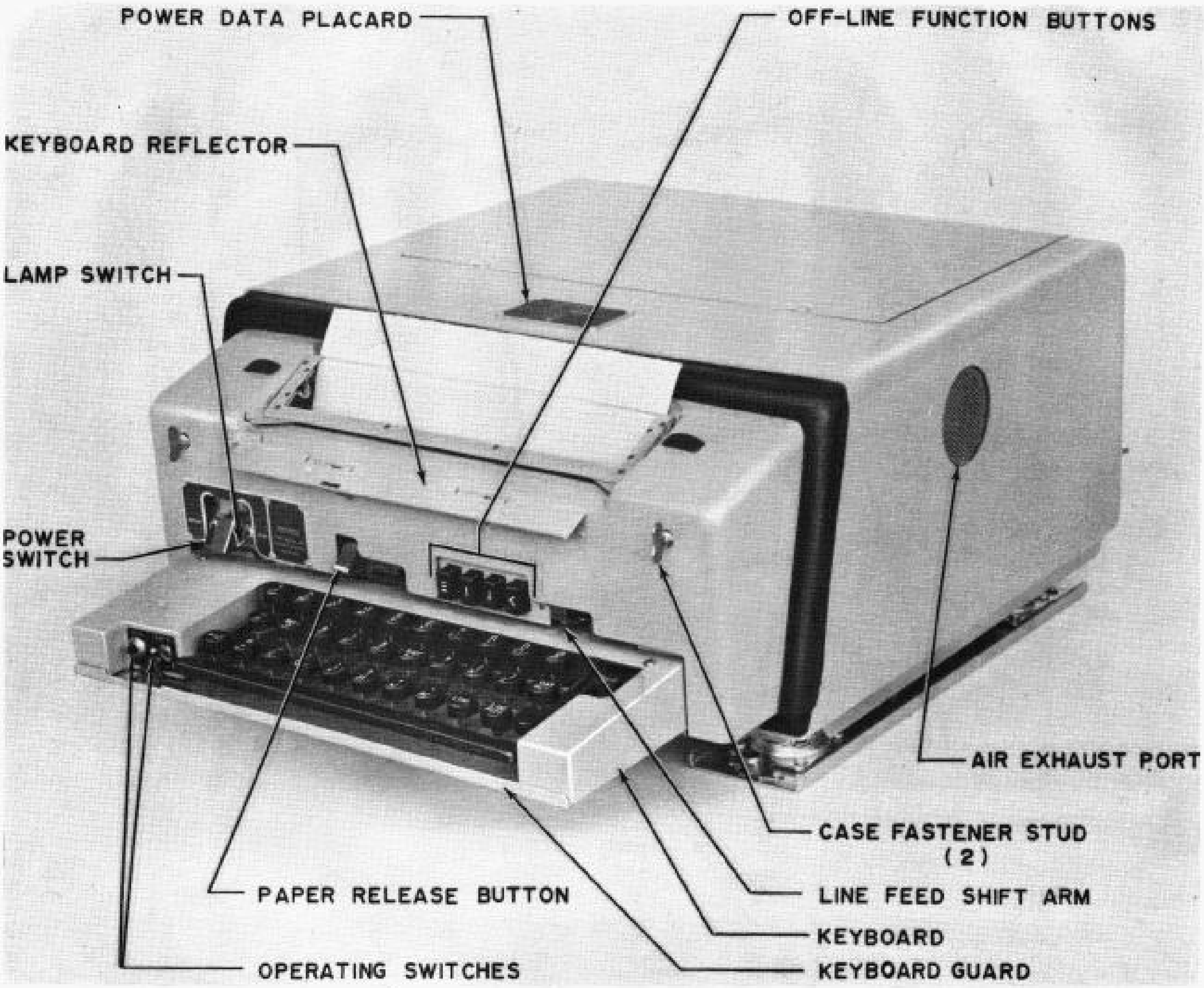


Figure 1-3. Teletypewriter Set Ready for Operation

It is a plug-in printed circuit board mounted on the left-rear side of the electrical chassis. The rear of the chassis (Figure 1-4) houses two fuse holders for the (1.5 ampere) primary power line fuses. Figure 1-4 also shows the location of the two service cable receptacles through which all power, signal line, and ground connections are made. The bench test primary power and signal service cables (not supplied as part of the unit) are shown in Figure 1-6. A plug-in type transformer, located in the right rear of the electrical chassis (see Figure 1-5), supplies operating voltages for the line sensor power supply and copy lamps.

The metal case, shown in Figures 1-1 and 1-4, may be opened from the top for replacement of paper and fuses without removing the printer from the case. The running spares kit is attached to the rear of the chassis.

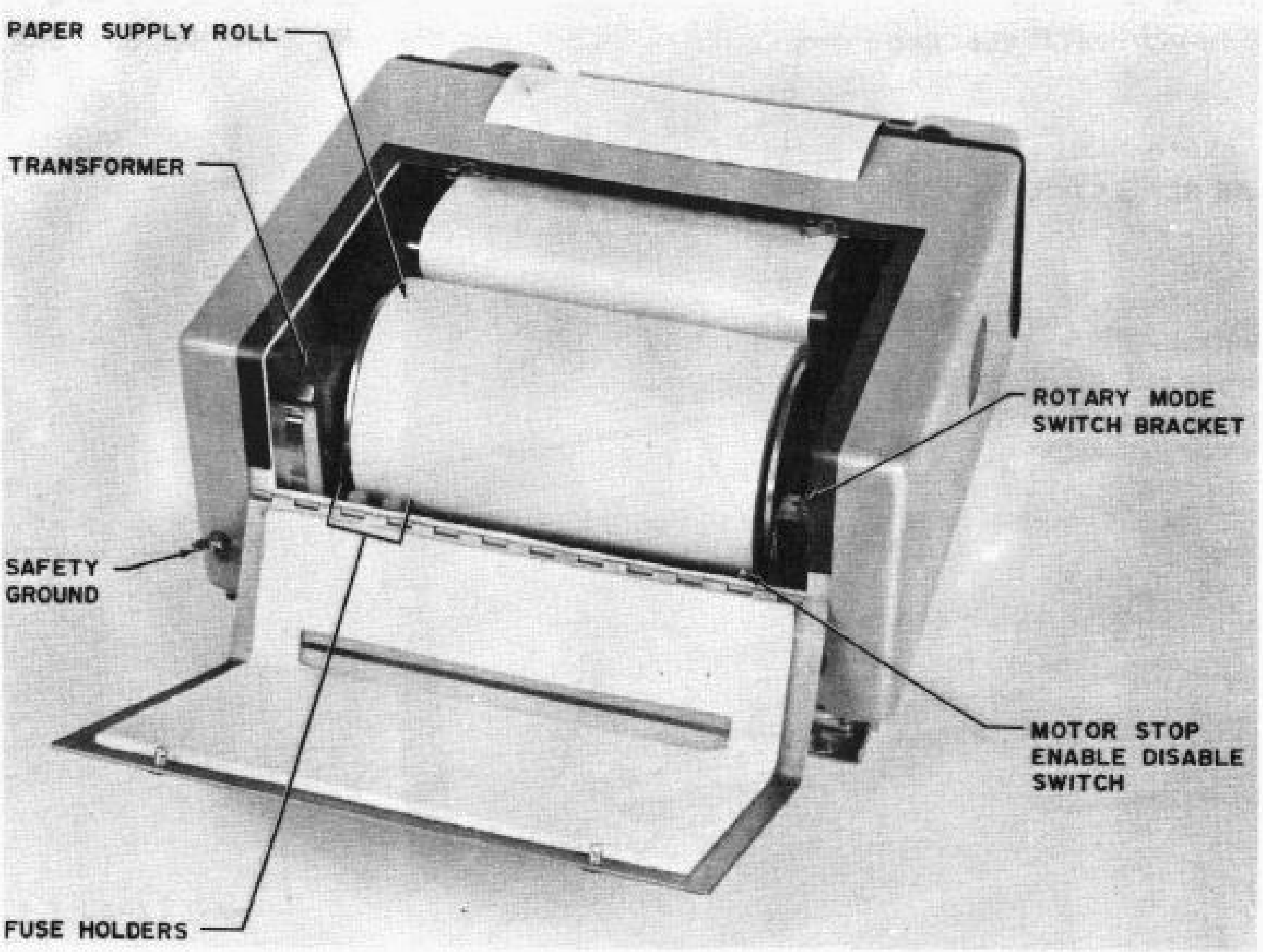
Inlet and exhaust ventilation ports are provided. A slot at the rear of the case is used for admitting the externally stored fan-fold, sprocket feed copypaper.

1-3. REFERENCE DATA.

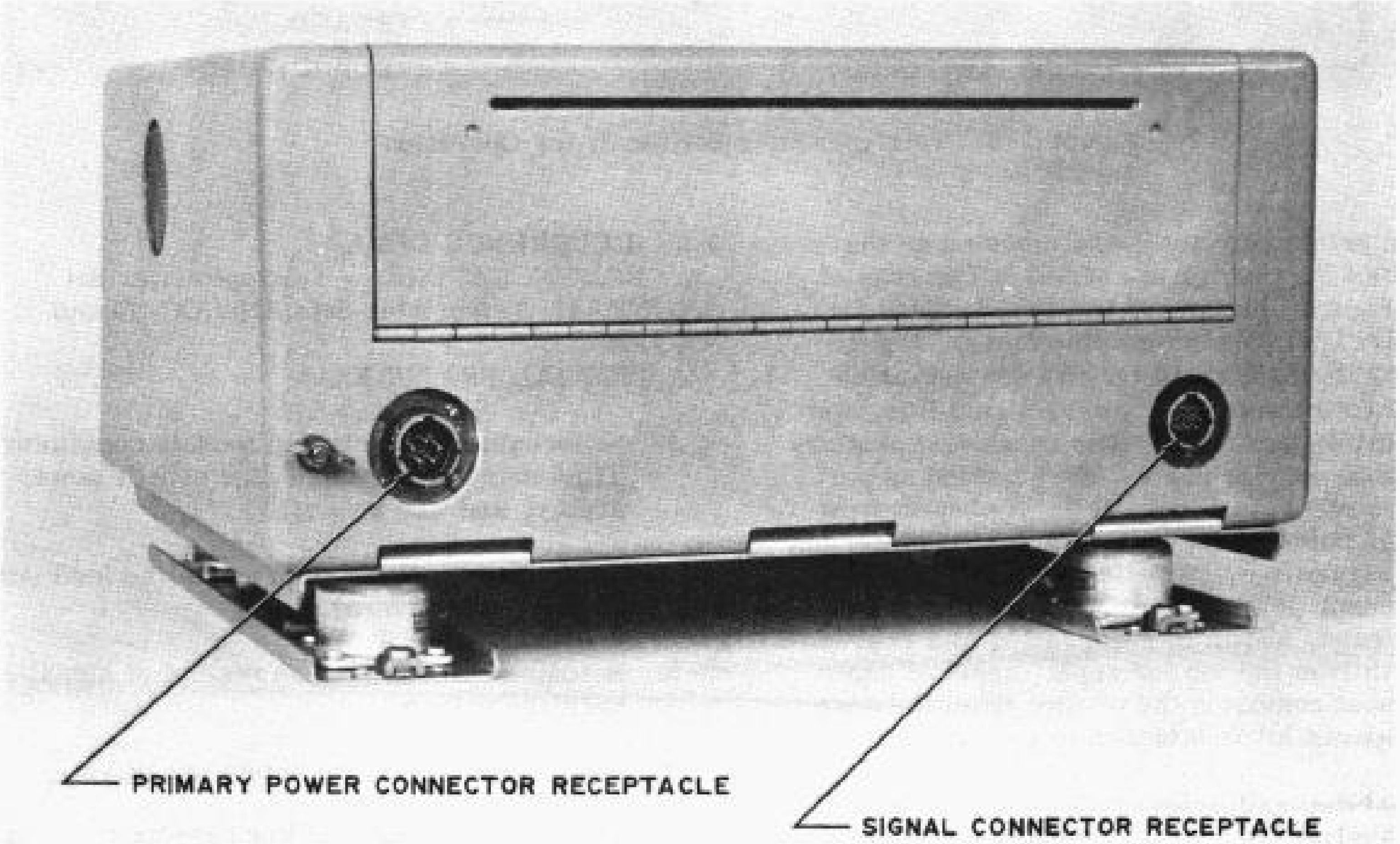
a. NOMENCLATURE. - Teletypewriter Set AN/UGC-41; Teleprinter Sets AN/UGC-40 and AN/UGC-38.

b. SPECIAL FEATURES.

1. Self-contained electronic module containing: Time delay motor stop, line sensor power supply, and line sensor.
2. Automatic carriage return and line feed (after 72 or 76 characters).
3. Automatic line feed upon receipt of signalled carriage return.
4. Input signal line not polarity sensitive.
5. Provision for high and low current range operation.



A. Teletypewriter Set


PRIMARY POWER CONNECTOR RECEPTACLE
SIGNAL CONNECTOR RECEPTACLE

B. Teletypewriter Set

Figure 1-4. Teletypewriter Set, Rear View

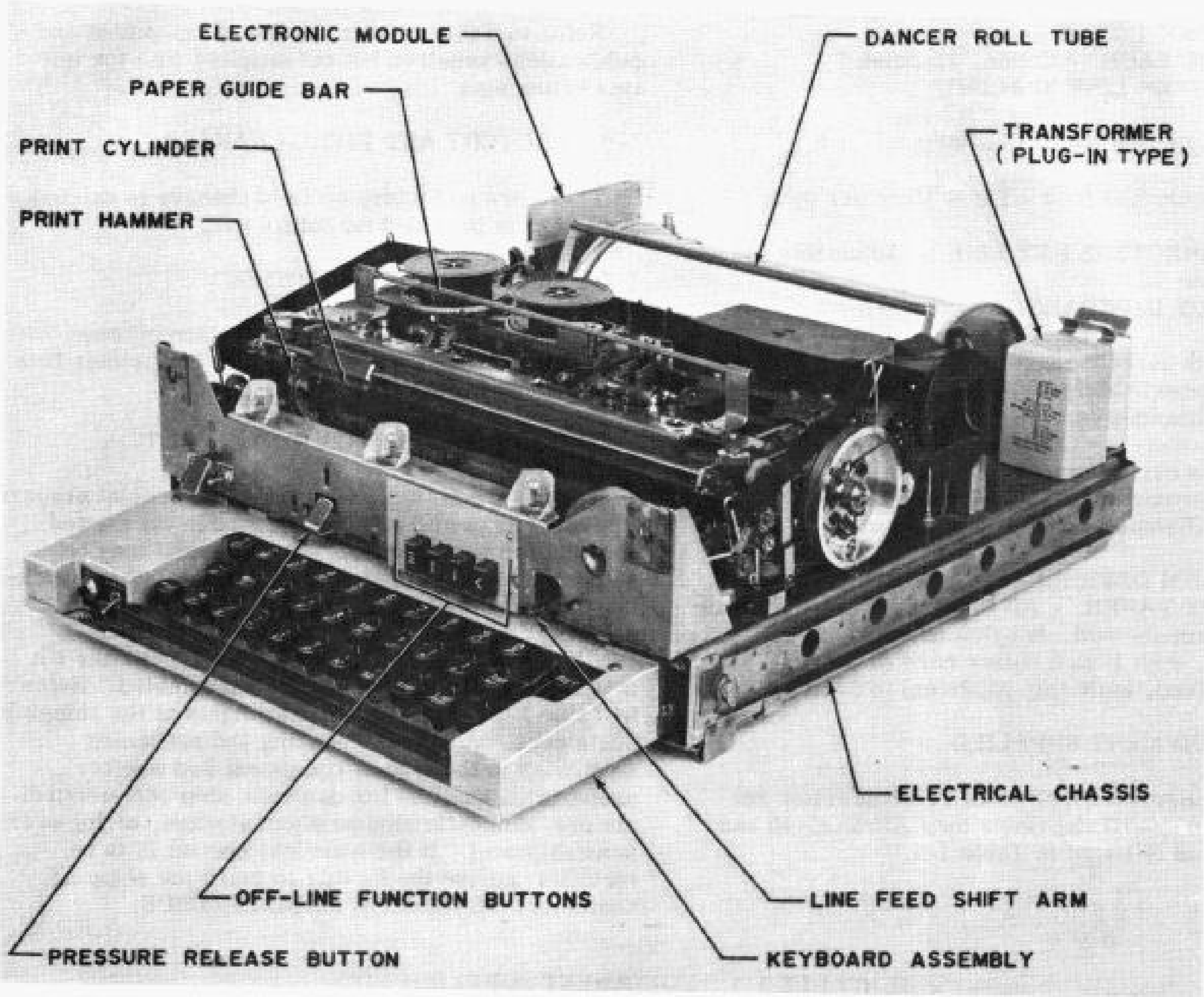


Figure 1-5. Teletypewriter Set, Case and Cover Removed

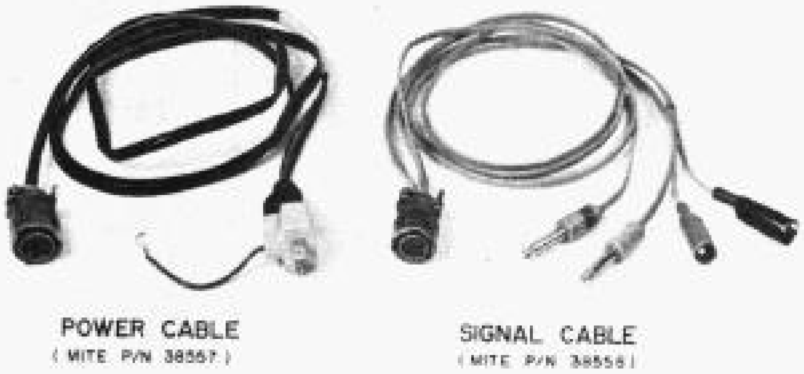


Figure 1-6. Primary Power and Signal Service Cables

6. May be installed into signal line of 20 to 80 milliamperes without internal adjustment.

7. Offers a resistive load to signal line.

8. Units do not print or space on non-printing functions (Letters, Figures, Line Feed, Carriage Return, and Blank, AN/UGC-38 prints (-) on Figures-Blank.

9. Internal paper supply for single- or multi-ply paper rolls (8-1/2-inches wide by 5-inches in diameter with a 1-inch hollow core) or exnally stored fan-fold, sprocket feed, multi-ply copy paper (up to 6-ply).

10. Keyboard interlock prevents transmission if remote station is not ready to receive (AN/UGC-41 only).

c. POWER REQUIREMENTS. - 115 volts alternating current, 60 cycles per second, single-phase, 112 watts.

d. TYPE OF INSTALLATION. - Non-tactical, airborne, and fixed station.

e. OPERATING SPEED. - Gears for 60, 66, or 100 words-per-minute.

f. SIGNAL CODE TYPE. - Direct-current pulse, five-level, 7.42 unit, Baudot serial, neutral line.

g. KEYBOARD. - Standard communications (supplies with AN/UGC-41 only).
h. TYPE OF CHARACTERS. - English (weather code with AN/UGC-38 only).
i. TYPE FACE. - Gothic, 12-point.
j. PRINTER LINE SPACING.

1. Single line feed - Six lines per inch.

2. Double line feed - Three lines per inch.

k. CHARACTERS PER LINE. - Adjustable for either 72 or 76.
l. INPUT IMPEDANCE.

1. High current range (20 to 80 milliamperes) - Approximately 185 ohms, resistive, at 60 milliamperes.

2. Low current range (2.5 to 10 milliamperes) - Approximately 1500 ohms, resistive, at 5 milliamperes.

m. ALARM DEVICE. - Signal activated bell.
n. COPY PAPER. - All three units use maximum 5-inch diameter roll, (single- or multi-ply), 8-1/2-inch wide, with 1-inch hollow core or fan-fold, sprocket feed, multi-ply paper (up to 6-ply).

1-4. EQUIPMENT SUPPLIED.

The equipment supplied as Teletypewriter Set AN/UGC-41 and Teleprinter Sets AN/UGC-40 and AN/UGC-38 is listed in Table 1-1.

1-5. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED.

Refer to Table 1-2 for the list of equipment and publications required but not supplied with the teletypewriter sets.

1-6. FACTORY AND FIELD CHANGES.

There are no factory or field changes in existence. Table 1-3 is provided for future use.

1-7. EQUIPMENT SIMILARITIES.

Refer to Table 1-4 for a comparison between Teletypewriter Set AN/UGC-41 and Teleprinter Sets AN/UGC-40 and AN/UGC-38.

1-8. PREPARATION FOR RESHIPMENT.

The teletypewriter sets require no special preparation other than placing the keyboard in the stowed position for reshipment. The equipment may be shipped to another operating site or depot by repacking the complete teletypewriter set in the original shipping container in accordance with packing specification MIL-P-17555E. A teletypewriter set may also be shipped partially disassembled. Refer to Table 1-5 for the sizes and weights of the shipping containers. Advise the packing and packaging facility as to the type of equipment and whether preparation shall be for domestic shipment-immediate use, domestic shipment and storage, or for overseas shipment. If the technical manual is to be included, advise the facility to mark the shipping container, TECHNICAL MANUAL INSIDE.

TABLE 1-1. EQUIPMENT SUPPLIED

QTY	NOMENCLATURE		UNIT NO.	OVERALL DIMENSIONS (INCHES)			VOLUME (CUBIC FEET)	WEIGHT (POUNDS)
	NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH		
	Teletypewriter Set includes:	AN/UGC-41	1	7-7/8	15	* 17-3/16 ** 20-1/16	-	37.9
1	Teleprinter	TT-531/UGC-41	1A2	4-1/2	12-3/4	9	0.30	13.9
1	Keyboard-Transmitter Teletypewriter	TT-332/UG	1A4	1-1/2	12	8-1/4	0.09	3.9
1	Chassis Electrical Equipment	CH-561/UG	1A1	5-1/2	13-1/8	14-1/8	0.60	7.4
1	Cover Teletypewriter	CW-896/UG	1 Amp	5-1/2	15	4-1/8	0.20	1.5
1	Case Teletypewriter	CY-6063/UG	1A5	7-7/8	15	14-1/2	1.0	9.5

*Keyboard in stowed position.
**Keyboard in operating position.

TABLE 1-1. EQUIPMENT SUPPLIED (Cont)

QTY	NOMENCLATURE		UNIT NO.	OVERALL DIMENSIONS (INCHES)			VOLUME (CUBIC FEET)	WEIGHT (POUNDS)
	NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH		
	Teleprinter Set includes:	AN/UGC-40	1	7-7/8	15	17-3/16	-	33.9
1	Teleprinter	TT-530/UGC-40	1A2	4-1/2	12-3/4	9	0.30	13.9
1	Chassis Electrical Equipment	CH-561/UG	1A1	5-1/2	13-1/8	14-1/8	0.60	7.4
1	Cover Teleprinter	CW-895/UG	1 Amp	5-1/2	15	4-1/8	0.20	1.5
1	Case Teletypewriter	CY-6063/UG	1A5	7-7/8	15	14-1/2	1.0	9.5
	Teleprinter Set includes:	AN/UGC-38	1	7-7/8	15	17-3/16	-	33.9
1	Teleprinter	TT-529/UGC-38	1A2	4-1/2	12-3/4	9	0.30	13.9
1	Chassis Electrical Equipment	CH-561/UG	1A1	5-1/2	13-1/8	14-1/8	0.60	7.4
1	Cover Teleprinter	CW-895/UG	1 Amp	5-1/2	15	4-1/8	0.20	1.5
1	Case Teletypewriter	CY-6063	1A5	7-7/8	15	14-1/2	1.0	9.5

TABLE 1-2. EQUIPMENT REQUIRED BUT NOT SUPPLIED

QTY	NOMENCLATURE		REQUIRED USE
	NAME	DESIGNATION	
1	Multimeter	AN/PSM-4	Check resistance, current, and voltage.
1	Oscilloscope	AN/USM-105	Observe waveforms.
1	Electronic Multimeter	TS-505/U	Check voltages.
1	Teletypewriter Tool Kit	TK-122/U, TK-188/U	Make adjustments.
1	Maintenance Fixture required for AN/UGC-41 only	MITE P/N 37200	Performing power-on adjustments.

TABLE 1-3. FACTORY OR FIELD CHANGES

CHANGE NUMBER	TITLE AND PURPOSE	SERIAL NO. AFFECTED	INDICATION OF ACCOMPLISHMENT

TABLE 1-4. EQUIPMENT SIMILARITY

	AN/UGC-41	AN/UGC-40	AN/UGC-38
Primary Power Supply	115 vac 60 cps single phase	Same as AN/UGC-41	Same as AN/UGC-41
Signal Code	Sends and receives 7.42 unit Baudot code at speeds of 60, 66, and 100 wpm.	Receives 7.42 unit Baudot code (no send capability).	Same as AN/UGC-41
Switching Options	Operates in full-duplex on-line, or in off-line (local) modes.	Same as AN/UGC-41	Same as AN/UGC-41
Line Length	Normally prints 76 characters per line; can be adjusted for 72 characters.	Same as AN/UGC-41	Same as AN/UGC-41
Paper Feed Mechanism	Uses pressure feed paper stored within case or sprocket feed paper stored externally and admitted through slot in rear of non-tactical case.	Same as AN/UGC-41	Same as AN/UGC-41
Motor Stop Mechanism	Uses time delay motor stop; turns off motor, leaving the Teletypewriter Set in standby condition if no mark-to-space transition is received for 60 seconds; receipt of first mark-to-space transition automatically restarts motor.	Same as AN/UGC-41	Same as AN/UGC-41
Keyboard	Transmits 7.42 unit Baudot code.	No keyboard	No keyboard
Case	Supplied in Non-Tactical Case CY-6063/UG (shock mounted).	Same as AN/UGC-41	Same as AN/UGC-41

TABLE 1-5. CRATED SIZES AND WEIGHTS

NOMENCLATURE		UNIT NO.	OVERALL DIMENSIONS (INCHES)			*VOLUME (CUBIC FEET)	*WEIGHT (POUNDS)	FEDERAL STOCK NUMBER
NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH			
Teletypewriter Set	AN/UGC-41		12-1/2	19-3/4	22-3/4	4.9	55	-
Teleprinter Set	AN/UGC-40		12-1/2	19-3/4	22-3/4	4.9	51	-
Teleprinter Set	AN/UGC-38		12-1/2	19-3/4	22-3/4	4.9	51	-

*Equipment crated and ready for shipment.

SECTION 2

INSTALLATION

2-1. INTRODUCTION.

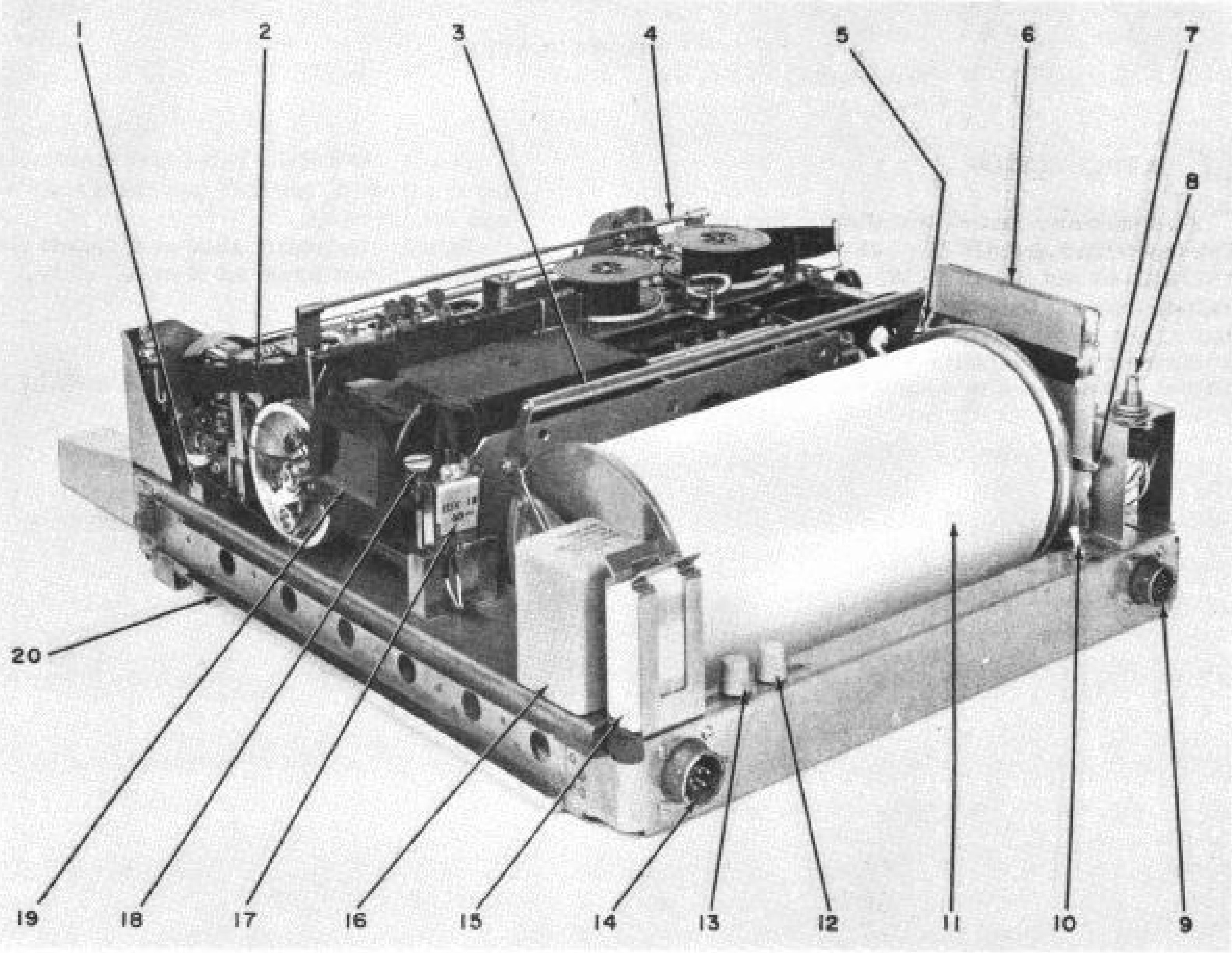
This section contains installation instructions for Teletypewriter Set AN/UGC-41 and Teleprinter Sets AN/UGC-40 and AN/UGC-38. These instructions include information on site selection, unpacking, mating connector wiring (signal and power), performance check, adjustments, and final preparation for use. Reference is made to the left, right, front.

Step 4. Carefully pull top of front cover out toward front of machine (approximately 1/2 inch) and lift cover up.

Step 5. Carefully slide printer and electrical chassis forward and out of case.

CAUTION

WHEN PLACING PRINTER AND ELECTRICAL



KEY	ITEM
1	Printer slide locks (one on each side)
2	Ribbon
3	Dancer roll tube (part of pager brake)
4	Paper guide
5	Selector connector plug
6	Electronic module (printed circuit board)
7	Paper roll lock arm
8	Rotary mode switch
9	Signal line connector
10	Motor stop enable-disable switch
11	Paper roll
12	Primary power fuse (F2)
13	Primary power fuse (F1)
14	Primary power connector
15	Spare parts kit
16	Transformer
17	Motor connector plug
18	Printer attaching (rear lock) screws (one on each side)
19	Cooling outlet
20	Electrical chassis

Figure 2-1. Printer and Electrical Chassis Parts Location

Step 15. Replace printer on electrical chassis by reversing Steps 7 through 11.

Step 16. Check mechanical operation of printer by manually turning mainshaft and observing for possible binding and free operation of all clutches.

Step 18. Inspect felt oil wicks for adequate oil supply and ascertain that all clutches and cam followers have been lubricated as detailed in Section 5.

2-3. POWER REQUIREMENTS AND DISTRIBUTION.

a. POWER REQUIREMENTS. - Refer to Table 2-1 for primary power requirements.

b. POWER DISTRIBUTION - Primary power distribution for the alternating current configuration is shown in Figure 4-6.

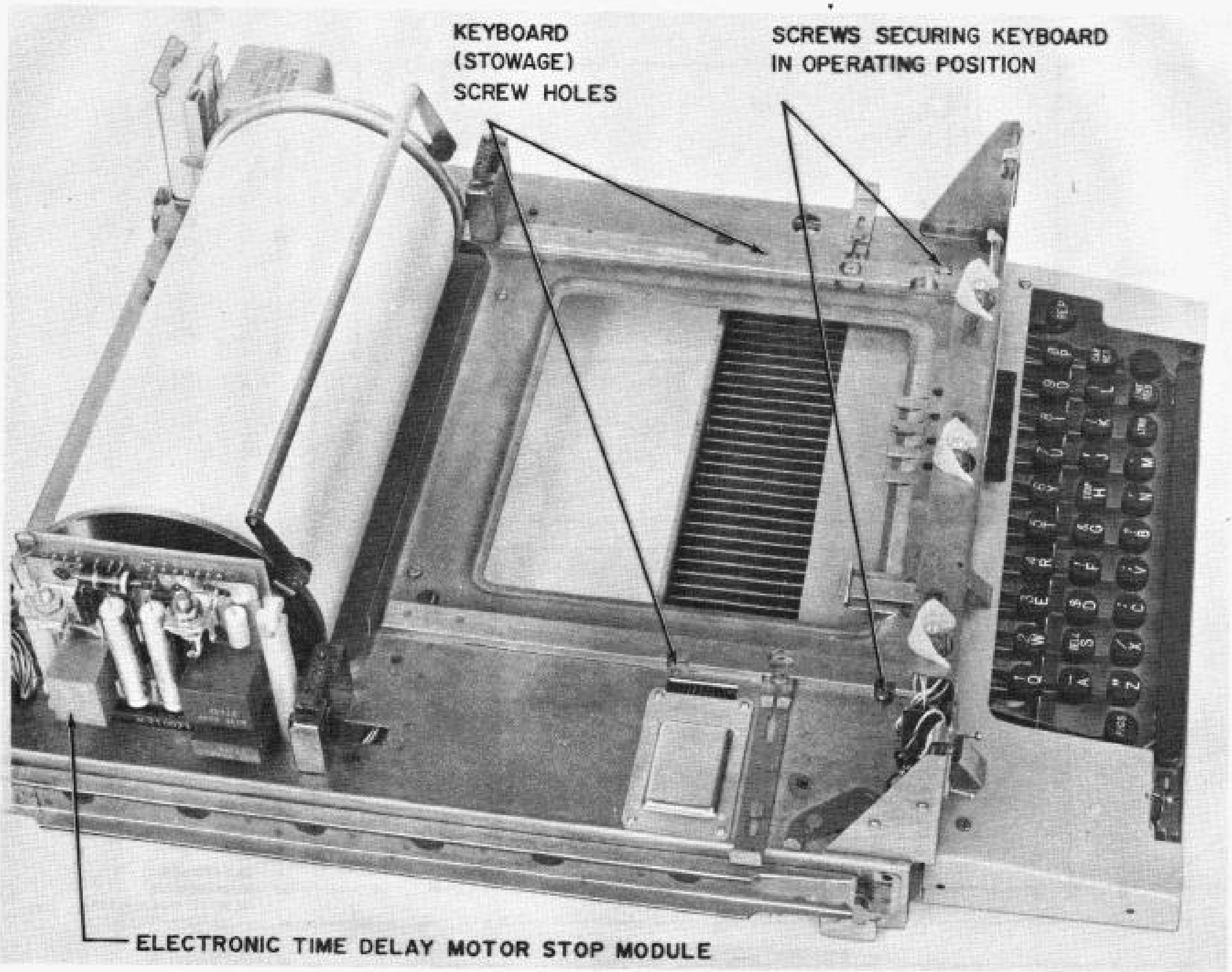


Figure 2-2. Left Side View of Chassis Electrical Equipment CH-561/UG

TABLE 2-1. PRIMARY POWER SOURCE REQUIREMENTS

PRIMARY POWER SOURCE	COMPONENTS REQUIRED	NOMENCLATURE	MITE PART NO.	POWER REQUIREMENTS (WATTS)
115 ±10% vac	Teletypewriter Set	AN/UGC-41	37502	112
60 ±5% cps	Teleprinter Set	AN/UGC-40	37500	112
	Teleprinter Set	AN/UGC-38	37501	112

2-4. SITE SELECTION.

The primary considerations in selecting an installation site are the availability of a primary power, signal line, and adequate facilities for making a good ground connection. If possible, select a site close enough to the primary power source and signal line to allow direct connection. Determine the exact nature of the primary power source to be certain it is compatible with the equipment. Refer to Figure 2-3 for space requirements for installation of Non-Tactical Case CY-6063/UG.

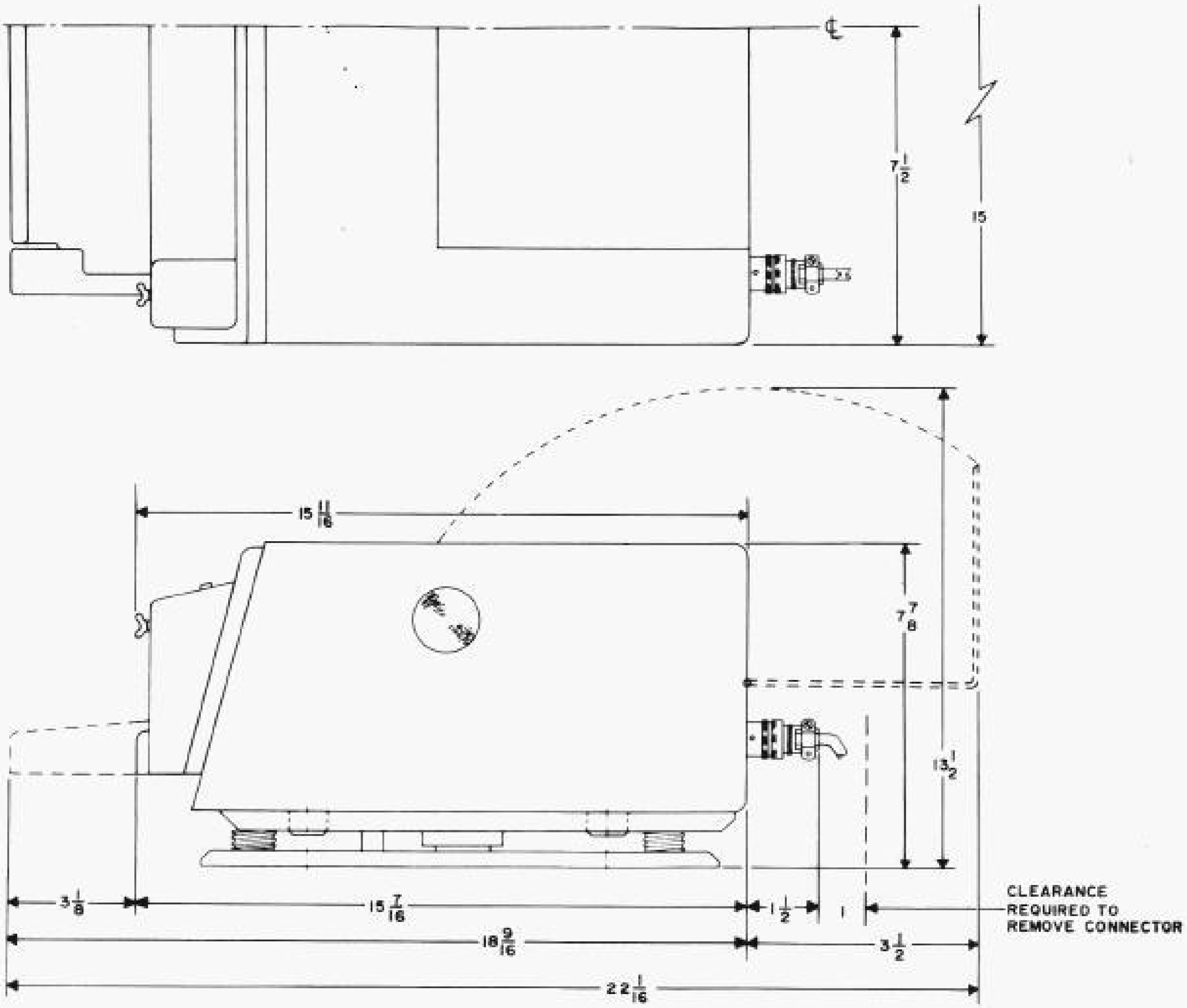


Figure 2-3. Non-Tactical Case CY-6063/UG (AN/UGC-41) Overall Dimensions

2-5. INSTALLATION OF SHOCK MOUNTED CASE CY-6063/UG.

CAUTION

WHEN INSTALLING A SINGLE TELETYPEWRITER OR TELEPRINTER, A MINIMUM CLEARANCE OF 2-INCHES FOR COOLING AND SWAY SPACE MUST BE PROVIDED.

WHEN INSTALLING TWO (2) OR MORE UNITS SIDE BY SIDE (IN-LINE), ESTABLISH A MINIMUM CLEARANCE OF 6-INCHES BETWEEN UNITS TO PREVENT HOT AIR EXHAUST FROM ONE UNIT ENTERING THE NEIGHBORING UNIT AND ALSO TO ALLOW ADEQUATE SWAY SPACE. FAILURE TO MEET THIS REQUIREMENT WILL RESULT IN DRYING OF LUBRICANTS, FAILURE OF CIRCUIT COMPONENTS, AND EXCESSIVE WEAR ON MOVING PARTS. WHERE IT IS NOT POSSIBLE TO SATISFY THE MINIMUM CLEARANCE REQUIREMENTS OF 6-INCHES FOR MULTI-UNIT INSTALLATIONS, A DEFLECTION PLATE MOUNTED MIDWAY BETWEEN UNITS, ADHERING TO THE SINGLE UNIT INSTALLATION CRITERIA OF 2- INCHES, MUST BE PROVIDED. THESE DEFLECTION PLATES CAN BE FABRICATED LOCALLY BY THE INSTALLING ACTIVITY.

All three equipments are shipped with shock mounts. Perform the installation of Case CY-6063/UG as follows:

Step 1. Drill eight 5/16-inch holes through mounting surface for the 1/4-28 mounting screws. Space holes as shown in Figure 2-4.

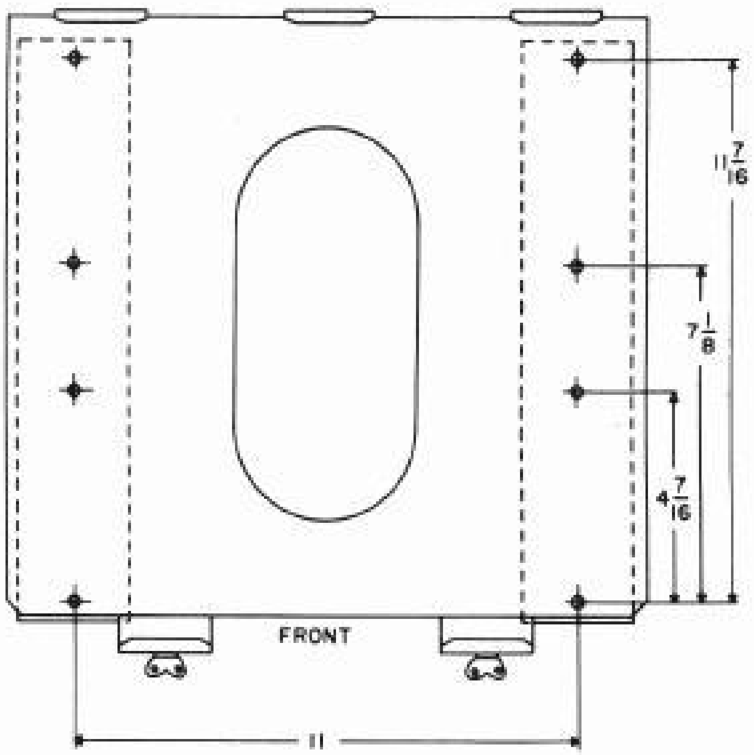


Figure 2-4. Case CY-6063/UG Shock-Mounted Installation Mounting Holes Location

NOTE

> If for any reason it is desired to separate the case from the shock mount, loosen the two thumb screws on the front of the shock mount far enough to release the case and then lift the case off the mount. Conversely, the case is placed on the shock mount with the three prongs on the back of the mount engaged with the three slots in the back of the case and secured by tightening the two thumb screws.

Step 2. Position case and shock mounts over drilled holes. Insert the 1/4-28 screws through mounting surface and thread into captive nuts in shock mount.

Step 3. Use washers between screw head and bottom of mounting surface as shims to ensure that mounting screw does not protrude far enough to hinder motion of shock mount (approximately two threads should show).

2-6. MATING CONNECTOR WIRING TECHNIQUE (For service cables).

Teletypewriter Set AN/UGC-41 and Teleprinter Sets AN/UGC-40 and AN/UGC-38 are supplied with two unwired mating connectors: the power connector, for primary power and ground (MITE Corporation Part No. 5511-188); and the signal connector, for send, receive, and auxiliary circuits (MITE Corporation Part No. 5511-190). Wiring of mating connectors is performed by the using facility as instructed in Paragraphs 2-6a and 2-6b.

a. PRIMARY POWER CONNECTOR (Five pin, MITE Corporation Part No. 5511-188). - Wiring of the primary power connector (Figure 2-5) is performed as follows.

Step 1. Strip outer cable jacket to expose approximately 3/4-inch of leads. Strip 3/16-inch of leads to bare wire.

NOTE

> Leads should be tinned before soldering into connector insert cups to prevent loose strands and to permit ease of entry.

Step 2. Unscrew insert (1, Figure 2-5) from insert retainer and clamp assembly (5) by turning insert (1) counterclockwise.

Step 3. Loosen two clamp screws in insert retainer and clamp assembly (5). Remove clamp insulation (6).

Step 4. Remove rubber gland (3) from cups on insert assembly, (1).

Step 5. Remove shell (4) from insert (1).

Step 6. Fill solder cups with solder. (Refer to Figure 2-5.)

Step 7. Slide following parts onto cable (8) in this order: clamp insulation (7), insert retainer and clamp assembly (5), shell (4), and rubber gland (3).

NOTE

> Cable leads are inserted through holes in rubber gland (3). Refer to rear view of insert (1) to position leads in proper gland (3) holes for alignment with insert cups (2).

Step 8. Solder service cable leads to insert cups (2). Refer to Table 2-2 for lead designation.

Step 9. Slide rubber gland (3) over soldered leads and insert cups (2).

Step 10. Screw insert retainer and clamp assembly (5) onto insert assembly (1).

Step 11. Align clamp insulation (7) under two clamp leaves (6) and tighten clamp screws.

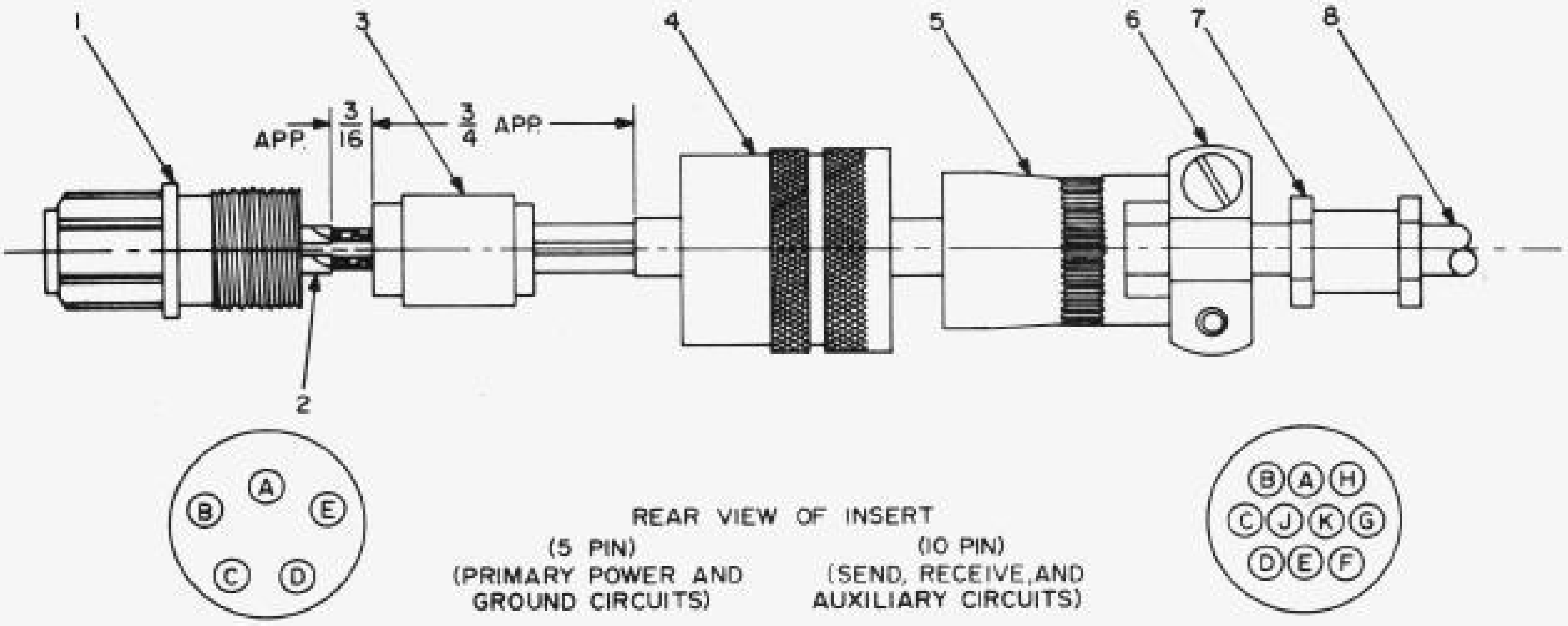
NOTE

> Insulation should be positioned so that clamp leaves are between insulation hubs.

b. SIGNAL CONNECTOR (Ten pin, MITE Corporation Part No. 5511-190). - Refer to Paragraphs 2-6a and 2-9d for the disassembly and reassembly technique and to the chart provided in Figure 2-5 for determining the signal cable lead connections.

2-7. PREPARATION FOR INITIAL PERFORMANCE CHECK AND ADJUSTMENTS.

a. SWITCHING FOR OFF-LINE (LOCAL MODE) TEST. - All three equipments are shipped from the factory with the rotary mode switch (8, Figure 2-1) in the on-line (high range) mode. This prevents damage to the line sensor by inadvertent connection to a high level current signal loop. Therefore, it is necessary to position the rotary mode switch to the off-line mode for test purposes. Use a coin or screwdriver to position the rotary mode switch notch so that it points to number 1 (off-line) on the switch bracket.



KEY	ITEM	KEY	ITEM
1	Insert	5	Insert retainer and clamp assembly
2	Insert cups	6	Clamp leaves
3	Rubber gland	7	Clamp insulation
4	Shell	8	Cable

UNWIRED SIGNAL MATING CONNECTOR (Ten Pin, MITE Corporation Part No. 5511-190)

INSERT CUP	FUNCTION	VOLTS	AMPERES	COLOR	AWG
	TELETYPEWRITER SET AN/UGC-41				
A	Keyboard-transmitter on-line data output	150	2.5-80 ma	Wht/Blk/Yel	22
B	Keyboard-transmitter on-line data output	150	2.5-80 ma	Wht/Brn/Grn	22
C	Teleprinter on-line data input	150	2.5-80 ma	Wht/Blk/Orn	22
D	Teleprinter on-line data input	150	2.5-80 ma	Wht/Red/Gy	22
E	Transmitter control			Wht/Blk/Gy	22
F	Transmitter control			Wht/Blk/Grn	22
G	Remote keyboard-transmitter SYNC pulse			Wht/Blk/Blu	22
H	Remote keyboard-transmitter SYNC pulse			Wht/Blk/Vio	22
J, K	Spares	-	-	-	-
	TELEPRINTER SETS AN/UGC-38 and AN/UGC-40				
A	Remote keyboard-transmitter off-line data input	13	8.7 ma	Wht/Blk/Yel	22
B	Remote keyboard-transmitter off-line data input	13	8.7 ma	Wht/Blk/Grn	22
C	Teleprinter on-line data input	150	2.5-80 ma	Wht/Blk/Orn	22
D	Teleprinter on-line data input	150	2.5-80 ma	Wht/Red/Gy	22
E, F, G, H, J, K	Spares	-	-	-	-
	POWER CONNECTOR (Five Pin, MITE Corporation Part No. 5511-188)				
A	115 v ±10%, 60 cps ±5%, 1 ø	115	1.0	Blk	20
B	Ground	0	0	Grn	20
C	115 v ±10%, 60 cps ±5%, 1 ø (system ground)	115	1.0	Wht	20
D, E	Spares	-	-	-	-

Figure 2-5. Exploded View of Connector (Typical)

b. FUSE INSTALLATION. - All equipments are shipped with 1.5 ampere primary power line fuses installed in the fuse holders (12, 13, Figure 2-1). Turn the fuse holder caps counterclockwise to remove. Check for presence of 1.5 ampere fuses in each fuse holder. If fuses are not in the holders, remove spare fuses from the spare parts kit and install.

c. RIBBON INSTALLATION. - Install the ribbon in accordance with instructions in Paragraph 3-4a(2).

NOTE

It is recommended that only nylon ribbons, MITE Corporation Part No. 05048-0001 (FSN 1N5815-975-9676), be used since lint from cotton ribbons could fall into the printer assembly. This could create a need for increased cleaning and maintenance.

d. PAPER INSTALLATION. - Install paper in accordance with the instructions in Paragraph 3-4a(3).

2-8. INITIAL PERFORMANCE CHECK AND ADJUSTMENTS.

a. GENERAL. - Teletypewriter Set AN/UGC-41 will be used to describe initial performance check procedures (Paragraph 2-8d). Teleprinter Sets AN/UGC-40 and AN/UGC-38, which are receive-only units, require an external keying device in order to perform initial performance procedures.

NOTE

The teletypewriter set should be removed from its case (refer to Paragraph 2-2b, Steps 3, 4, and 5) prior to performing service cable connection during preliminary check and adjustments.

b. SERVICE CABLE CONNECTION. - The following procedure can be used for connecting both cables. Since the primary power connector (five pin) is smaller than the signal connector (ten pin), there should be no difficulty in distinguishing between the two connectors. Connect both service cable connectors to their receptacles in rear of chassis as follows:

CAUTION

BE CERTAIN THAT SIGNAL LINE CURRENT IS KNOWN AND THAT MODE SWITCH IS IN CORRECT POSITION PRIOR TO CONNECTING THE SIGNAL CONNECTOR. LO POSITION IS FOR OPERATION WITH 2.5 TO 10 MA. HI POSITION IS FOR OPERATION WITH 20 TO 80 MA.

Step 1. Set POWER and LAMP switches to OFF position.

CAUTION

DO NOT APPLY EXTERNAL SIGNAL LINE BATTERY TO PINS A AND B OF THE SIGNAL CONNECTOR OF TELEPRINTER SETS AN/UGC-38 AND AN/UGC-40 WHILE IN THE OFF-LINE MODE OR SERIOUS DAMAGE TO THE LINE SENSOR POWER SUPPLY MAY BE INCURRED.

NOTE

Placing the POWER switch in the OFF position does not prevent signal line current from entering the unit.

Step 2. Inspect service cable receptacles (Figure 2-1) to ensure that no foreign matter is present.

CAUTION

IF ANY INTERFERENCE OR BINDING IS ENCOUNTERED WHILE PERFORMING THE FOLLOWING STEPS, IMMEDIATELY REMOVE THE CONNECTOR PLUG FROM THE RECEPTACLE AND DETERMINE THE CAUSE OF THE INTERFERENCE.

Step 3. Align key of service cable connector plug with its respective keyway service cable receptacle.

Step 4. Carefully insert service cable connector plug into its respective service cable receptacle. Turn sleeve of connector plug 1/4-turn clockwise to secure it.

CAUTION

ALWAYS GROUND THE (PRIMARY POWER) SERVICE CABLE BY USING A GROUNDED RECEPTACLE.

Step 5. Before applying power, make certain that equipment is switched to the off-line mode (Paragraph 2-7a).

NOTE

The in-coming signal line is open when mode switch 1A1S3 is in the off-line position.

c. INITIAL TURN-ON PROCEDURE. - Set the MOTOR and LAMP switches to the ON position. Copy lamps should illuminate paper. Motor should start as evidenced by an audible hum.

d. INITIAL PERFORMANCE CHECK. - Teletypewriter Set AN/UGC-41 is shipped from the factory with both keyboard interlock and line feed on carriage return mechanisms disabled. To perform initial performance check it is not essential to enable these mechanisms. The keyboard interlock is required only during secured operation and should remain disabled during all other operation. Instructions for enabling and disabling the keyboard interlock mechanism are contained in Section 5.

Perform initial performance check as follows:

NOTE

A check of both keyboard interlock and line feed mechanisms is required only when use of these mechanisms is anticipated.

Step 1. Check to ensure that all instructions in Paragraph 2-7 have been performed.

Step 2. Set keyboard SEND.REC/REC switch to SEND.REC position. Refer to Figure 3-1 for location of operating controls.

Step 3. Depress each alphanumeric key three times to ensure that each character is satisfactorily printed.

Step 4. Depress LTRS key and then A key; letter A should print. Depress FIGS key and then A key; a hyphen (-) should print. Repeat this sequence several times.

NOTE

Check that no print or space occurs when LTRS or FIGS key is depressed.

Step 5. Depress any alphanumeric key and REP key simultaneously. Maintain pressure on REP key and release alphanumeric key. Character for key depressed should be repeated until REP key is released.

Step 6. Depress space bar and REP key simultaneously. Release space bar and allow printer to operate through several lines. Automatic carriage return and line feed must function at end of each line.

Step 7. Depress FIGS key and then S key. Bell must ring each time S key is depressed.

Step 8. Depress A key and REP key simultaneously. Release A key. Allow several characters to be printed. Quickly depress and release off-line letters (↓) button; observe that a series of A's is printed. Quickly depress and release off-line figures (↑) button and observe that a series of hyphens is printed. Repeat previous sequence several times while maintaining constant pressure on REP key to ensure that off-line letter and figures shift satisfactorily operates.

NOTE

Advance is prevented if any off-line button is depressed. This condition applies whether printer is receiving traffic or in an idle condition. With the exception of the off-line letters function, each of the off-line functions can be accomplished while the unit is idle (motor running; no receipt or transmission of intelligence). If printer is already in position selected by the off-line button, printer will not shift but advance will be prevented while button is depressed.

Step 9. Depress off-line carriage return (<) button and observe that carriage return occurs. Type approximately a half line of characters and then depress off-line carriage return button. Observe that carriage return occurs.

Step 10. Depress off-line, line feed button (≡). Observe that line feed occurs.

Step 11. Allow unit to remain idle and note that motor shuts off after interval of 60 to 120 seconds. Momentarily depress BREAK button and observe that motor starts. Repeat this sequence several times.

NOTE

Motor will stop when there are no mark-to-space transitions for 60 to 120 seconds. An electronic time delay motor stop automatically turns motor off and places line sensor in standby condition.

e. ADJUSTMENTS. - The following adjustments should be performed prior to final preparation for use (Paragraph 2-9).

(1) LOCAL RANGE ADJUSTMENT. - Refer to Figures 2-6 and 2-7 and proceed as follows:

Step 1. Check that rotary mode switch notch is positioned for off-line mode (local loop).

Step 2. While typing a test message, unlock range dial by pulling out range finder knob; turn knob clockwise to point where message starts to garble.

Step 3. Record number indicated on range dial.

Step 4. Continue to type test message and turn knob counterclockwise past point of optimum operation until message again starts to garble.

Step 5. Record number indicated on range dial.

Step 6. Calculate point of optimum operation as follows:

$$\frac{\text{High} + \text{Low}}{2} = \text{Point of Optimum Operation}$$

$$\text{Example: } \frac{100 + 20}{2} = 60 \text{ (Optimum Setting)}$$

Step 7. Calculate points of range as follows:

High - Low = Points of Range

Example: 100 - 20 = 80 (Points of Range)

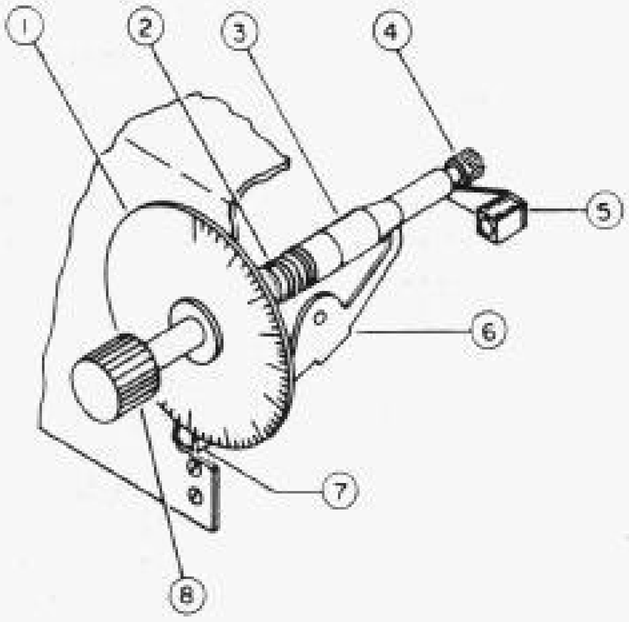
Step 8. Turn knob so that pointer is directly over number established as point of optimum operation.

Step 9. Push knob against printer to ensure that mechanism is adequately locked.

NOTE

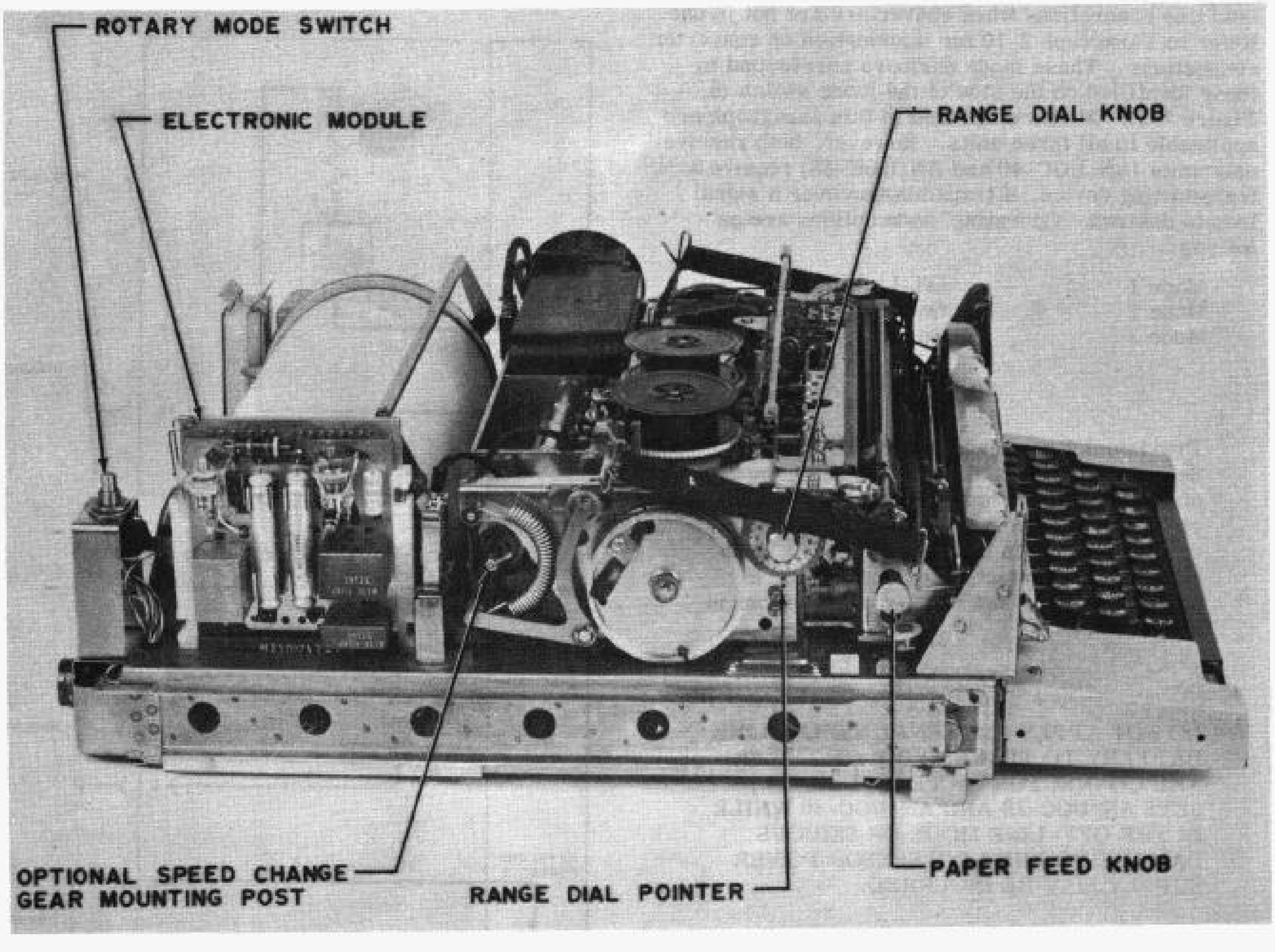
If uncalibrated portion of range dial falls under pointer, proceed with Steps 10 through 14.

Step 10. Unlock range dial by pulling knob out as far as possible and turn knob to its clockwise limit. Push knob in toward printer, locking it in this position.



KEY	ITEM
1	Range dial
2	Range finder lock helical spring
3	Conical range finder slide lock
4	Range pinion
5	Retaining lever
6	Range finder lock lever
7	Range dial pointer
8	Range finder knob

Figure 2-6. Range Dial Adjustment, Part Location



KEY	ITEM	KEY	ITEM
1	Rotary mode switch	4	Range dial
2	Electronic module	5	Paper feed knob
3	Optional speed change gears	6	Range dial pointer

Figure 2-7. Printer and Electrical Chassis, Left-Side View

Step 11. Unlock retaining lever. Pull complete assembly out until range pinion is no longer engaged with range adjustment gear segment.

Step 12. Rotate knob until pointer is centered in uncalibrated portion of scale.

Step 13. Push knob toward printer, rotating slightly back and forth, until gears mesh and retaining lever locks range dial.

Step 14. Repeat Steps 2 to 9 of local range adjustment (Paragraph 2-8e(1)).

(2) OUTSIDE LOOP RANGE ADJUSTMENT. - Preferred method of ranging printer is performed using outside loop to which printer will ultimately be connected. Select on-line (outside loop) mode of operation as instructed in Paragraph 2-9b or 2-9c and request that a test message be sent from a remote station. The actual calibration procedure is same as local range adjustment procedure.

2-9. MODE OPTIONS.

Mode options described in this paragraph are referred to as Modes 1 through 3 and are applicable to land line connections when converters are not in use. Refer to Paragraph 2-10 for information on converter connections. These mode numbers correspond to those identified on the side of the mode switch (8, Figure 2-1). Modes discussed in this paragraph are applicable to all three units. However, both receive-only units (AN/UGC-40 and AN/UGC-38) require a transmitting device, if transmission over a signal loop is desired. Operating mode options are as follows:

Mode 1	Off-Line (Local)
Mode 2	On-Line, Low Level
Mode 3	On-Line, High Level

NOTE

Provisions have been made in Teleprinter Sets AN/UGC-38 and AN/UGC-40 for input of external dry-contact keying from a TD or keyboard to pins A and B of the signal connector when in the off-line mode. If no external dry contacts are supplied, or if pins A and B are not shorted, the equipment will run open.

CAUTION

DO NOT APPLY EXTERNAL SIGNAL LINE BATTERY TO PINS A AND B OF THE SIGNAL CONNECTOR OF TELEPRINTER SETS AN/UGC-38 AND AN/UGC-40 WHILE IN THE OFF-LINE MODE OR SERIOUS DAMAGE TO THE LINE SENSOR POWER SUPPLY MAY BE INCURRED.

a. MODE 1 - OFF-LINE (local mode). - In the off-line mode (see Figure 2-8) the unit functions as an electric typewriter with signal line (2.5 to 10 ma internal loop) supplied internally. Position the rotary mode switch (8, Figure 2-1) so that the notch is pointing toward number 1 (extreme counterclockwise).

NOTE

Off-line (local mode) is used primarily for test purposes.

b. MODE 2 - ON-LOW (On-line, low level mode). - On-line (low level) mode is full-duplex operation (see Figure 2-9) and means that communications can be carried on between two points in both directions simultaneously. Low level signal loop current (2.5 to 10 ma) is to be supplied externally for both send and receive signal lines. Position the mode switch (8, Figure 2-1) so that the notch is pointing toward number 2 (center position).

c. MODE 3 - ON-HIGH (On-line, high level mode). - On-line (high level) mode of operation is full-duplex, (see Figure 2-9) meaning that communications can be carried on between two points in both directions simultaneously. High level signal loop current (20 to 80 ma) is to be supplied externally for both send and receive signal lines. Position the mode switch (8, Figure 2-1) so that the notch is pointing toward number 3 (extreme clockwise position).

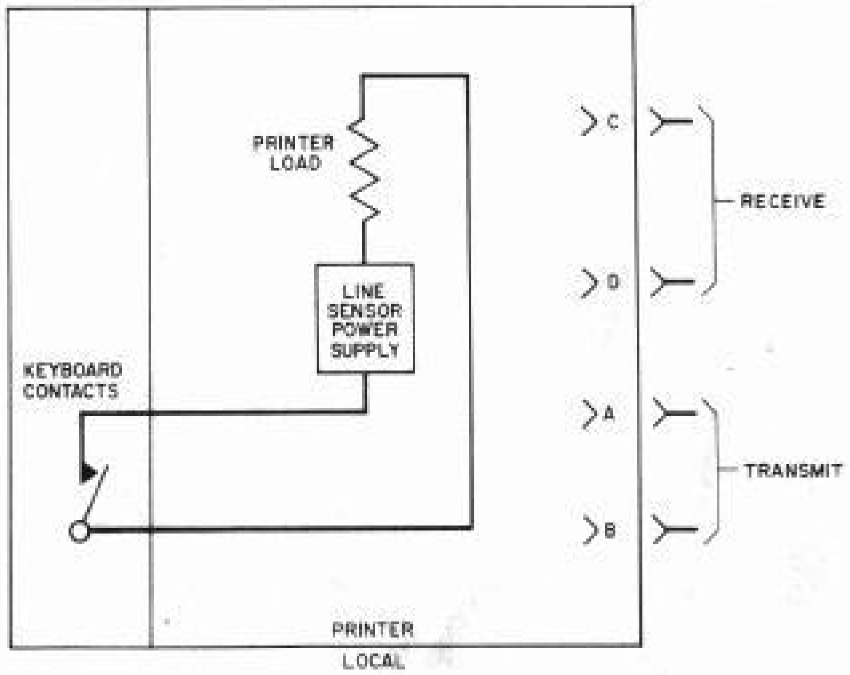


Figure 2-8. Off-Line, Mode 1 (Local)

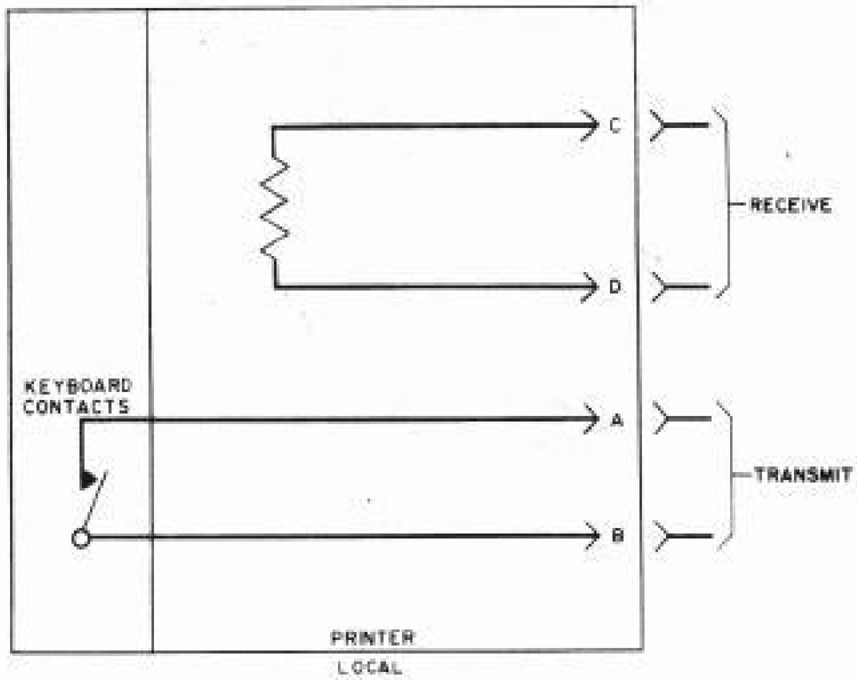


Figure 2-9. On-Line (Low level, Mode 2)
(High level, Mode 3)

d. HALF-DUPLEX MODE. - Half-duplex operation can be accomplished with Teletypewriter Set AN/UGC-41 in one of two manners: the unit can be patched externally on the ships patching panel by connecting the signal lines to pins A and D and externally shorting pins B and C of the signal connector, or when it is anticipated that half-duplex mode will be utilized on a continuing basis, the signal lines can be brought in on pins A and D and a shorting strap soldered across pins B and C of the signal connector. When patched in this manner, it is still necessary to correctly position the rotary mode switch for HIGH or LOW current operation as defined in Paragraphs 2-9b and 2-9c.

2-10. EQUIPMENT CONNECTION TO CONVERTORS AND/OR RADIO TRANSMITTERS.

Since all three equipments are supplied with mating connectors, the mating connector wiring technique (Paragraph 2-6) should be followed to wire them to convertors and/or radio transmitters. Teletypewriter Set AN/UGC-41 is capable of keying a transmitter through use of the circuit connected to the SEND. REC/REC switch on the keyboard. However, it is necessary to complete the transmitter control circuit through Pins E and F when wiring mating send, receive, and auxiliary circuit connector, if keying of a remote transmitter is desired.

2-11. SPEED CHANGE GEAR REPLACEMENT.

The teletypewriter set and teleprinter sets are supplied with a choice of three speed-change gears. Establish the operating speed and install the correct color-coded gear. The 60 word-per-minute (45.45 Baud) gear is coded blue; the 66 word-per-minute (50 Baud) gear is coded yellow; and the 100 word-per-minute gear is coded white. Refer to Figure 2-7 for location of optional speed change gears. To replace a speed change gear (Figure 2-10), turn off equipment and proceed as follows:

Step 1. Loosen and remove speed change gear lock knob.

Step 2. Loosen idler gear locknut and allow idler gear and locknut to swing away from speed change gear.

Step 3. Remove speed change gear.

Step 4. Select desired replacement speed change gear and install so that its slot engages pin on post.

Step 5. Ensure that speed change gear is properly seated and install speed change gear lock knob on shaft.

Step 6. Swing idler gear up and against speed change gear to mesh gears, taking care not to exert excessive pressure. Allow minimum backlash (distance between the gears).

Step 7. Tighten idler gear locknut while holding speed change gear and idler gear in mesh with the other hand. Adjust backlash to approximately 0.002 inch.

Step 8. Run motor. If excessive gear noise indicates too much or too little backlash, stop motor and readjust backlash. Repeat this procedure for minimum gear noise.

Step 9. Store replaced speed change gear on optional speed change gear mounting post (Figure 2-7).

2-12. FINAL PREPARATION FOR USE.

Upon completion of adjustments and tests necessary to ascertain that teletypewriter set is functioning properly, re-install set into case as follows:

Step 1. Set POWER and LAMP switches to OFF position.

Step 2. Remove both connector plugs from electrical chassis by carefully turning sleeve 1/4-turn counterclockwise and pulling out.

Step 3. Align electrical chassis groove with slides in case and insert assembly into case.

NOTE

> The half-circle locks on each side of the electrical chassis have now come in contact with the half-circle locks in the case. These matching half circles are locked together by a fork located in the front cover.

Step 4. Secure electrical chassis in case by engaging locking fork in front cover. Press bottom of front cover down and then push top in toward case.

Step 5. Secure front cover by engaging two quick-disconnect fastener studs with 1/4-turn clockwise.

Step 6. Connect both cable connector plugs as instructed in Paragraph 2-8b.

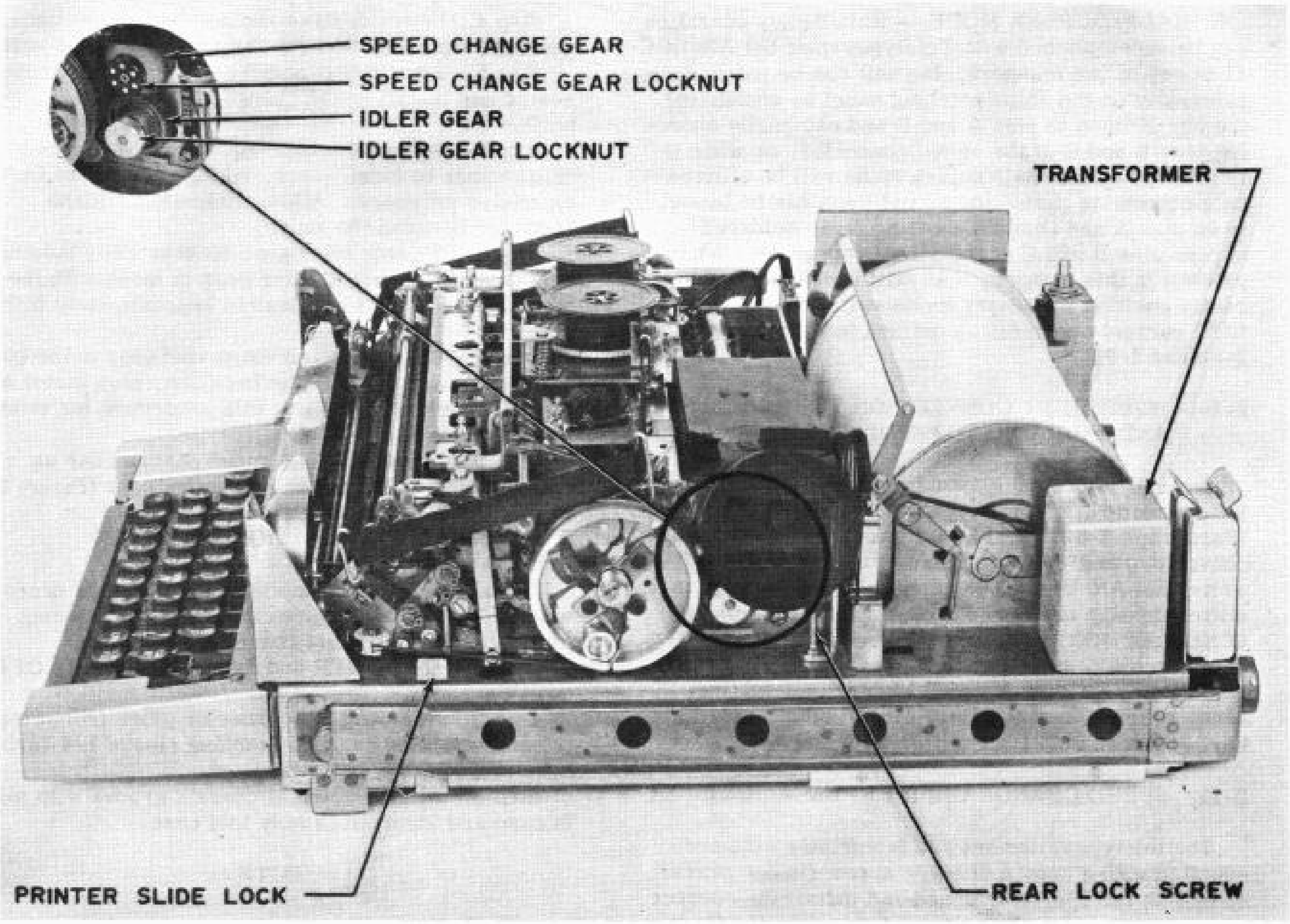


Figure 2-10. Right Side View of Teletypewriter Set AN/UGC-41, Case Removed

SECTION 3

OPERATION

3-1. GENERAL.

This section contains instructions for Teleprinter Sets AN/UGC-40 and AN/UGC-38 and Teletypewriter Set AN/UGC-41. This section is written on the premise that the teletypewriter and/or teleprinter sets have been installed and completely checked in accordance with the instructions in Section 2. The following discussion is directed toward Teletypewriter Set AN/UGC-41, in that the AN/UGC-38 and AN/UGC-40 are not equipped with a keyboard.

WARNING

OPERATION OF THIS EQUIPMENT INVOLVES VOLTAGES WHICH ARE DANGEROUS TO LIFE. DO NOT SERVICE OR ADJUST THE TELETYPEWRITER SET WHILE IT IS RUNNING UNLESS EXTREME CAUTION IS USED.

3-2. FUNCTIONAL OPERATION.

a. PURPOSE OF EQUIPMENT. - The teletypewriter set provides a means of exchanging typewritten page messages between two or more stations which are similarly equipped and connected by suitable transmission media. Teleprinter sets AN/UGC-40 and AN/UGC-38, which are receive-only units, provide a means of obtaining typewritten page messages from remote stations.

b. CAPABILITIES AND LIMITATIONS.

(1) PRIMARY POWER SOURCE. - The teletypewriter set is adaptable for use with 115 volts alternating current, 60 cycles per second primary power.

(2) OPERATING SPEED OPTIONS. - All three units may be adapted to operate at speeds of 60, 66, and 100 words per minute by changing speed change gears provided with the equipment. Additional gears for other operating speeds may be obtained from the manufacturer as required. Instructions for changing the gears are contained in Paragraph 2-11.

(3) OPERATING MODE OPTIONS. - The teletypewriter or teleprinter sets can be switched from off-line (local mode) to on-line (full duplex) operation by positioning the rotary mode switch located on the left-rear corner of the electrical chassis. Refer to Paragraph 2-9 for complete instructions for switching the mode of operation.

c. BASIC PRINCIPLES OF OPERATION. - The teletypewriter set provides a means of transmitting and receiving printed intelligence by exchanging series of coded pulses with similar equipment. The local teletypewriter set (AN/UGC-41) generates a standard five-level 7.42-unit, Baudot serial teletypewriter code which is sent over a transmission medium to a remote teletypewriter set. At the remote station the teletypewriter set receives, decodes, and prints the transmitted intelligence.

The AN/UGC-41 Teletypewriter Set is equipped with a keyboard interlock system. This system is enabled only when pulsed keyboard operation is required in conjunction with secure communications systems utilizing pulsed keyboard input. When the interlock system is enabled, it is necessary to disable the keyboard repeat key to negate erroneous transmissions. Instructions for this procedure are contained in Section 5 of this manual.

NOTE

When the keyboard interlock mechanism is enabled, the operator can depress any key lever. This action positions the code bars, stores the intelligence in the keyboard, and locks out all the remaining key levers. Upon receipt of a synchronous pulse, the keyboard clutch is released, and the intelligence stored in the keyboard is transmitted, and the keyboard is cleared for depression of the next key lever. When operating with the keyboard interlock mechanism enabled, do not, under any circumstances, depress the BREAK button. Depression of the BREAK button will open the signal line and enter erroneous data into the receiving station.

3-3. CONTROLS AND INDICATORS.

a. DESCRIPTION OF CONTROLS. - Refer to Table 3-1 for a listing of all operator's controls and functions. All index numbers referred to in Table 3-1 are shown in Figure 3-1.

b. DESCRIPTION OF INDICATORS. - The teletypewriter set is equipped with an audible signal bell used by the remote operator to alert the local operator to a forthcoming message. The bell is operated by striking the FIGS key and then the S key. If the keyboard interlock is disabled, the local operator can follow the same procedure (ring the signal bell at remote station) to notify the remote station that a message is forthcoming. In addition, a BREAK button is provided on the front of the keyboard to permit the local operator to open the signal line and notify the remote operator to stop sending.

3-4. OPERATING PROCEDURES.

a. SEQUENCE OF OPERATION. - To operate the teletypewriter set, perform the following procedures in accordance with the instructions given in the indicated subparagraphs:

Preliminary Starting Procedures - Subparagraph (1).
Installation of Ribbon - Subparagraph (2).

Installation of Paper - Subparagraph (3).
Starting Procedure - Subparagraph (4).
Operating Procedure and checks - Subparagraph (5).
Stopping Procedure - Subparagraph (6).

(1) PRELIMINARY STARTING PROCEDURE.

Step 1. Check that primary power and signal cables are connected to receptacles on set.

Step 2. Check ribbon; if it is damaged or dried out, replace it as instructed in Paragraph 3-4a(2).

Step 3. Check copy paper; if supply is low (indicated by red or purple line along edge of paper), install new supply as instructed in Paragraph 3-4a(3).

Step 4. Set LINE FEED control arm (located in notch in front cover, 9, Figure 3-1) for single or double spacing of lines.

(2) INSTALLATION OF RIBBON (See Figure 3-2).

NOTE

It is recommended that only nylon ribbons, MITE Corporation Part No. 05048 (FSN 1N5815-975-9676) be used since lint from cotton ribbons drops into printer mechanism and necessitates more frequent cleaning and servicing. If standard Underwood-type teletypewriter ribbons are not available, 1/2-inch typewriter ribbon is usable, provided that Underwood-type spools are used. If ribbon does not have eyelets, knot ribbon a few inches from each end and engage knots with the reversing arms in the manner used for reversing eyelets.

Step 1. Remove front cover by disengaging fastener studs with a counterclockwise turn and pulling top of cover approximately 1/2-inch forward; lift cover up and away from set.

Step 2. Remove both cables from teletypewriter set by turning the connector plugs counterclockwise and pulling them straight out.

Step 3. Carefully slide printer and electrical chassis out of case and place on a clean work surface.

Step 4. Remove paper from printer.

NOTE

Do not remove the ribbon feed assembly to replace the ribbon.

Step 5. Remove old ribbon, if installed, and retain one empty spool.

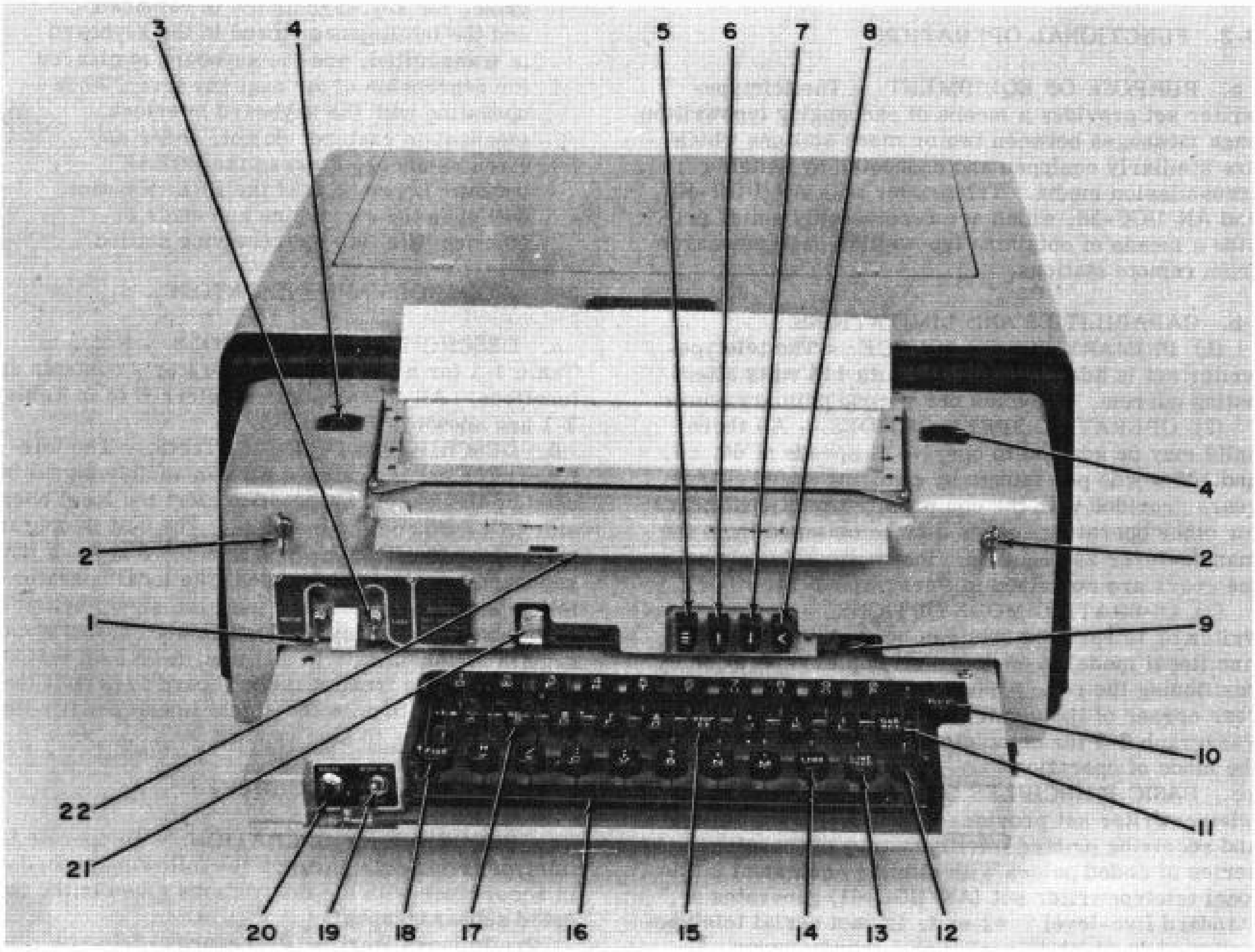


Figure 3-1. Operator's Controls

TABLE 3-1. OPERATOR'S CONTROLS

CONTROL	FIGURE 3-1 LEGEND	LOCATION	FUNCTION
POWER switch	1	Left side of printer, above keyboard	ON position turns on all primary power OFF position turns off all primary power
Fastener studs	2	Both sides of front cover	Locks front cover in place and secures teletypewriter in case
LAMP switch	3	Left side of printer, above keyboard	ON position lights the copy lamp OFF position extinguishes the copy lamp DIM position reduces the light intensity to approximately 1/2
Copy window release	4	Levers are located at top right and top left of front cover	Unlocks copy window when slid toward outside
Off-line line feed button (≡)	5	Button on right side of front cover	Feeds copy paper on local unit
Off-line figures button (↑)	6	Button on right side of front cover	Moves print cylinder of local teletypewriter set to figures position (no signal transmitted)
Off-line letters button (↓)	7	Button on right side of front cover	Moves print cylinder of local teletypewriter set to letters position (will not operate unless an incoming signal or signals are being received)
Off-line carriage return button (<)	8	Button on right side of front cover	Returns local teletypewriter set print cylinder to extreme left margin of paper (no signal transmitted)
Line feed shift arm	9	Notch in front cover	In the left position, causes paper feed rubber roll to move one line; in the right position, causes the paper feed rubber roll to move two lines
REP key	10	Top row, extreme right-hand end of keyboard	REP key must be disabled when keyboard interlock is enabled. When keyboard interlock is disabled, REP key is operable, and will repeat the last character or function sent from the keyboard, for as long as the key is depressed

TABLE 3-1. OPERATOR'S CONTROLS (Cont)

CONTROL	FIGURE 3-1 LEGEND	LOCATION	FUNCTION
CAR RET key	11	Middle row, extreme right-hand end of keyboard	Returns print cylinder to extreme left margin of paper. Also, supplies line feed when line feed on carriage return mechanism is operable.
Blank key	12	Bottom row, extreme right-hand of keyboard	Transmits blank code group NOTE Printing suppressed on AN/UGC-41 and AN/UGC-40, AN/UGC-38 prints (-) when in figures condition
LINE FEED KEY	13	Bottom row, second from right-hand end of keyboard	Moves paper up one or two line spaces on paper feed rubber roll depending on position of LINE FEED shift arm
LTRS key	14	Bottom row, third from right-hand end of keyboard	Shifts teletypewriter set to letters condition, enabling all letters to be typed
STOP key	15	Middle row, fifth from right-hand end of keyboard	AN/UGC-41 and AN/UGC-40 will print symbol (#), and AN/UGC-38 will print (⧫) symbol upon receipt of figures H. If teletypewriter set equipped with figures H motor stop in the loop, its motor will shut off upon receipt of figures H
Space bar	16	Bottom of keyboard	Causes hammer to move to the right without printing
BELL key (FIGS S)	17	Middle row, second from left-hand end of keyboard	Rings the signal bell, if struck after FIGS key, not after LTRS key
FIGS key	18	Bottom row, extreme left-hand end of keyboard	Shifts teletypewriter set to figures condition, enabling punctuation and other symbols to be typed
SEND. REC/REC switch	19	Left side of keyboard cover	REC position allows only reception, but not transmission; SEND. REC position allows both keyboard transmission, printing reception and keying of a remote radio transmitter or teleprinter
BREAK push button switch	20	Left side of keyboard cover	Opens signal line; used to start motors when turned off by time delay mechanism NOTE Do not use BREAK button when keyboard interlock mechanism is enabled.

TABLE 3-1. OPERATOR'S CONTROLS (Cont).

CONTROL	FIGURE 3-1 LEGEND	LOCATION	FUNCTION
Paper lock pressure release lever	21	Notch in front cover	Push serrated tab in and down to lock in place. This lifts the pressure rollers away from feed roller enabling the paper to be moved in center of feed mechanism. Lift serrated tab to re-engage pressure roller
Keyboard Reflector	22	Front cover	Illuminates keyboard with light reflected from copy lamps
Alphanumeric keys		Keyboard	Causes printing of letter or symbol, displayed on keytop by AN/UGC-41 and AN/UGC-40. Weather symbols rather than standard punctuation symbol are printed by AN/UGC-38
Paper feed knob	Not Shown	Under front cover on left side of printer	Feeds the paper through the paper feed rubber roll to facilitate paper installation
Time delay MOTOR STOP switch	(10, Figure 2-1)	On left rear of electrical chassis	Enables or disables time delay motor stop feature

Step 6. Place ribbon and spool (3, Figure 3-2) on left-hand ribbon spindle (4).

Step 7. Thread ribbon through reverse bar (2) and left-hand ribbon guide (1).

Step 8. Thread ribbon through front plate ribbon guide (14) across front of printer, threading it through hammer ribbon guide (13 and 11) and in front of hammer face (12).

Step 9. Thread ribbon through right-front plate ribbon guide (10), right-rear ribbon guide (9) and right-hand ribbon guide (8).

Step 10. Thread ribbon through fork in reverse bar (2).

Step 11. Engage end of ribbon with ribbon spool (6) and wind new ribbon onto spool until reversing eyelet (7) is on spool (6).

NOTE

Ensure that ribbon eyelet (7) is left of the right yoke in reverse bar (2) and on the ribbon spool (6). If it is not, ribbon will not reverse.

Step 12. Test operation of ribbon feed mechanism by starting printer motor; depress REPEAT key and then actuate (push right and left) reversing bar (2) several times.

NOTE

The start clutch must be turning for ribbon feed mechanism to operate.

Step 13. Install paper as instructed in Paragraph 3-4a(3).

(3) INSTALLATION OF PAPER.

(a) ROLL PAPER SUPPLY INSTALLATION.

Step 1. Remove front cover by loosening two fastener studs. Pull top of cover approximately 1/2-inch forward; lift entire cover up and away from teletypewriter set.

Step 2. Remove both cables from teletypewriter set by turning connector plug 1/4-turn counterclockwise and pulling straight out.

Step 3. Carefully slide printer and electrical chassis out of case and place on a clean work surface.

Step 4. Raise two paper support and brake drum assembly lock levers (Figure 2-1); lift paper support and brake drum assembly out of electrical chassis.

Step 5. Grasp knurled discs (3, Figure 3-3) on both ends of paper support and brake drum assembly and turn one end counterclockwise with respect to the other.

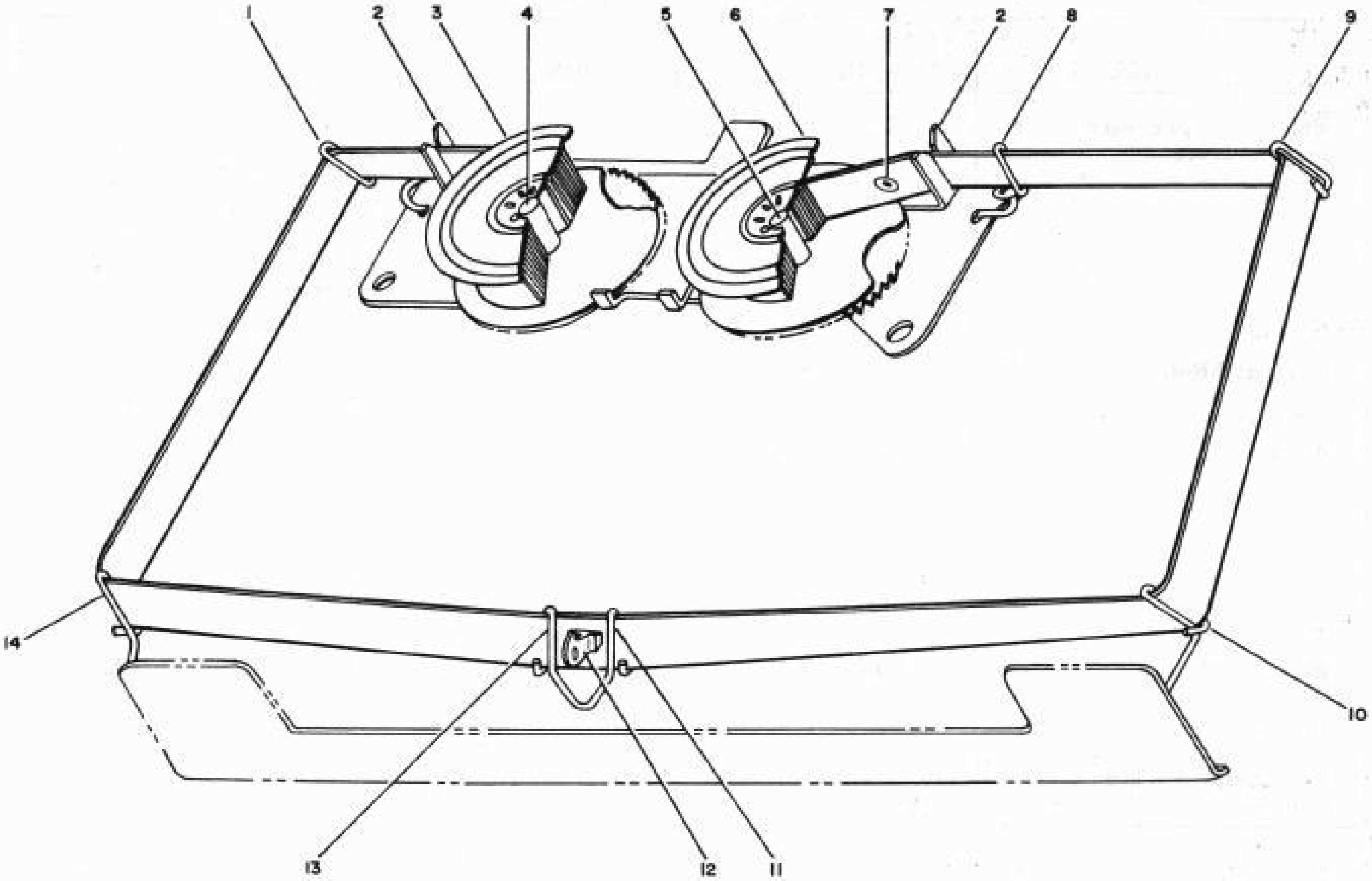
Step 6. Remove brake drum (4) from paper support shaft (2).

Step 7. Remove metal caps (if installed) that protect core of paper roll.

Step 8. Insert paper support shaft (2) through core of paper supply roll (1). Install brake drum (4) by turning knurled discs (3) on brake drums clockwise with respect to each other.

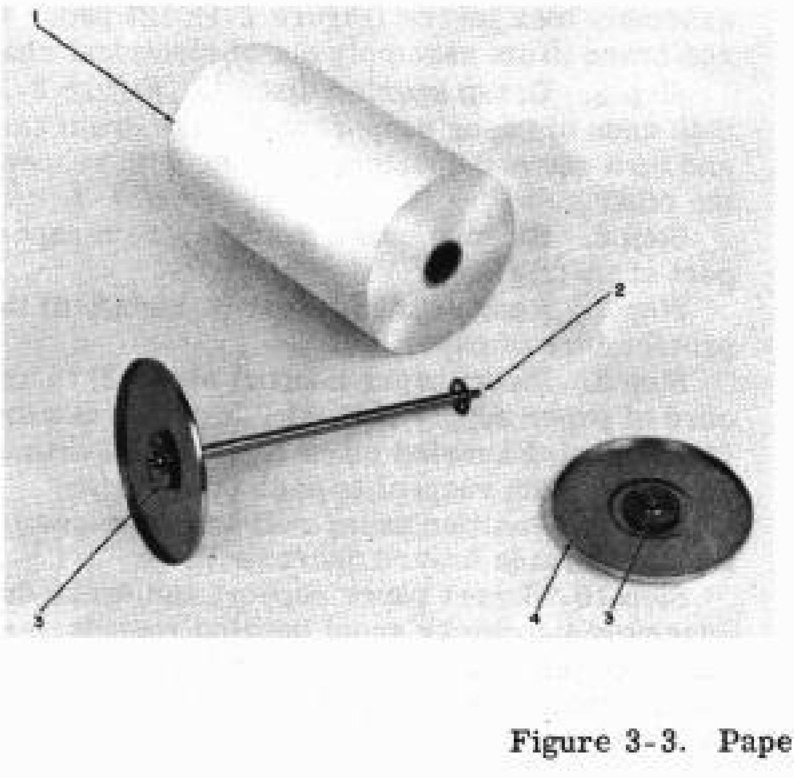
Step 9. Position paper roll so that paper feeds from underside toward operator.

Step 10. Insert paper support and brake drum assembly into paper spool bearing receptacles of electrical chassis. Lock into position by moving paper support and brake drum assembly lock levers back and down.



KEY	ITEM	KEY	ITEM
1	Left-hand ribbon guide	8	Right-hand ribbon guide
2	Reversing bar	9	Right-rear ribbon guide
3	Ribbon and spool	10	Front plate ribbon guide (right-hand)
4	Ribbon spindle (left-hand)	11	Hammer ribbon guide
5	Ribbon spindle (right-hand)	12	Hammer face
6	Ribbon and spool	13	Hammer ribbon guide
7	Eyelet	14	Front plate ribbon guide (left-hand)

Figure 3-2. Ribbon Threading Diagram



KEY	ITEM
1	Paper supply roll
2	Paper support shaft assembly
3	Brake drum knurled hub
4	Brake drum

Figure 3-3. Paper Spool Assembly

Step 11. Thread paper behind and over dancer roll tube and then over paper guide.

Step 12. Fold back approximately three inches of paper (to provide a straight edge) and insert paper down and behind return (red) cable and print cylinder.

Step 13. Gently press paper down and against paper feed rubber roll and pressure roll; rotate paper feed knob (Figure 2-8) counterclockwise until paper emerges at top of printer.

Step 14. If paper is not straight in printer depress paper release button, align edges, and lock paper by pushing up on paper release button.

Step 15. Align electrical chassis slide with track in case and carefully slide into case.

Step 16. If front cover is to be reinstalled, thread paper through opening.

Step 17. Install front cover by pressing bottom of cover into position, to lock electrical chassis in place, and swinging top of cover into closed position; then, engage two fasteners studs by pushing in and turning both clockwise.

Step 18. Install power and signal cable connector plugs into respective receptacles by aligning key of connector plug with keyway of receptacle, gently pushing in, and turning connector plug 1/4-turn clockwise.

(b) SPROCKET FEED PAPER SUPPLY INSTALLATION.

NOTE

In order to change from roll paper supply operation to sprocket feed paper operation it is necessary to perform the sprocket feed paper adjustment in Section 5 of this manual.

Step 1. Remove front cover by loosening two fastener studs, pulling top of cover approximately 1/2-inch forward, and then lifting cover up and away from teletypewriter set.

Step 2. Slide chassis out of case and remove plastic box located behind transformer (right-rear corner).

Step 3. Remove the eight sprocket teeth and hex wrench; install four sprocket teeth into threaded holes in each end of paper feed roll.

Step 4. Return wrench into plastic box and place box into clip on chassis.

Step 5. Disconnect two captive fasteners on hinged cover by turning them counterclockwise and lift cover.

Step 6. Fill front paper receptacle (Figure 3-4) with supply of fan-fold paper, being careful to position it so that master sheet faces bottom of teletypewriter.

Step 7. Carefully tear off one corner (or staple front edge) of paper to facilitate installation into equipment.

Step 8. Grasp end of paper, being careful to have carbon paper facing in correct direction, and feed paper through slot in rear of hinged cover.

Step 9. Slide chassis approximately halfway into case.

Step 10. Draw paper over paper guide and out through opening in front of case.

Step 11. Slide chassis all the way into case.

Step 12. Depress paper release button. Feed paper down between return (red) cable and print cylinder.

Step 13. Gently press paper down and against paper feed rubber roll and pressure roll; then rotate paper feed knob counterclockwise until paper emerges at top of printer.

NOTE

Ensure that sprocket teeth are properly engaged with the feed holes in the paper. Also, make certain that the paper release button remains in the RELEASE position.

Step 14. Open window on front cover and thread paper through cover. Install front cover by pressing bottom of cover into position to lock electrical chassis in place and swinging top cover into closed position.

Step 15. Engage two fastener studs by turning them counterclockwise.

Step 16. Close lid and secure with 1/4-turn fasteners.

Step 17. When operation has begun, check that copy paper feeds into rear paper receptacle as shown in Figure 3-4.

(4) STARTING PROCEDURE.

Step 1. Set MOTOR switch to ON position.

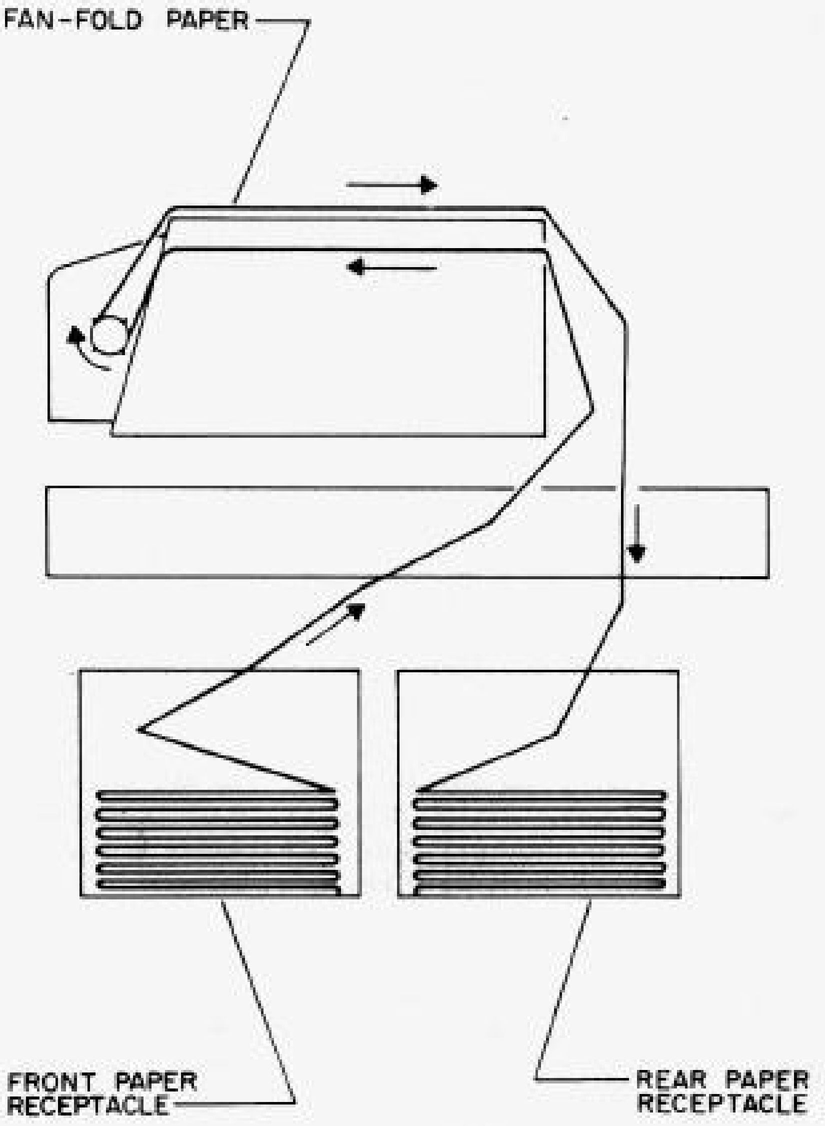


Figure 3-4. Sprocket Feed Paper Installation Diagram

Step 2. Set SEND. REC/REC switch to SEND. REC position for full duplex operation or to REC position for receive-only operation.

Step 3. Set LAMP switch to ON position.

NOTE

To start motor after it has been shut down by time delay motor stop, check that MOTOR switch is still in ON position and then depress BREAK button.

(5) OPERATING PROCEDURE AND CHECKS. - Perform the following operating checks prior to commencing operation:

Step 1. Check that automatic line feed and carriage return occur after 76th or 72nd character is printed and carriage return occurs when carriage return code impulse is received.

Step 2. Observe action of ribbon while printing. Ribbon spool must advance each time character is printed.

Step 3. Check space bar, FIGS key, and LTRS key to see that they function properly.

Step 4. Depress FIGS key and then depress A key. Observe that hyphen (-) prints. Depress REP key and momentarily depress letters off-line button protruding through front cover. Print cylinder should return to letters position as indicated by a series of A's.

Step 5. Space print cylinder toward center of page. Depress carriage return off-line button protruding through front cover. Print cylinder and hammer should return to left margin.

Step 6. Depress LTRS key and then depress figures off-line button protruding through front cover. Print cylinder should return to figure position.

Step 7. Depress off-line feed button (≡) protruding through front cover. Paper should continue to advance as long as button is depressed.

Step 8. Check signal bell by depressing FIGS key then S key; signal bell should ring.

Step 9. After a waiting interval (non-operation) of 60 to 120 seconds, observe that motor shuts off.

NOTE

When enabled, the time delay motor stop will shut off the motor when there are no mark to space transitions to 120 seconds.

Step 10. Depress BREAK button; motor should start.

Step 11. Depress any alphanumeric key and then depress REP key. Maintain pressure on repeat key and release alphanumeric key. Character will continue to be typed until REP key is released.

Step 12. Commence sending or receiving operations.

Step 13. If received message is garbled, perform applicable range calibration check as instructed in Paragraph 2-8e.

(6) STOPPING PROCEDURE.

Step 1. During operation, an operator at any sending station can stop motors of all teletypewriter sets, equipped with figure H motor stop feature, by depressing FIGS key and then H key. On teletypewriter and teleprinter sets equipped with the time delay motor stop feature, motor will shut off 60 to 120 seconds from receipt of last space-to-mark transition.

Step 2. Stop teletypewriter set and close it to traffic by setting MOTOR and LAMP switches to OFF position.

3-5. SUMMARY OF OPERATING PROCEDURES.

Refer to Table 3-2 for a summary of operating procedures.

3-6. OPERATOR'S MAINTENANCE.

Operator's maintenance consists of replacing ribbons, paper, fuses, and copy lamps. In addition, operator must check range calibration as described in Paragraph 3-6b. These procedures require no special tools or test equipment.

a. REPLACEMENT PROCEDURES.

(1) RIBBON REPLACEMENT. - Replace ribbon, when required, as instructed in Paragraph 3-4a(2).

(2) PAPER REPLACEMENT. - Replace paper, when required, as instructed in Paragraph 3-4a(3).

(3) FUSE REPLACEMENT. - To replace a defective fuse proceed as follows:

Step 1. Loosen two 1/4-turn fasteners on top hinged cover of case. Then open and swing hinged cover back.

Step 2. To replace defective fuse, turn fuse holder caps (12 and 13, Figure 2-1) counterclockwise and remove.

NOTE

Fuses are 1.5 amperes.

Step 3. Insert new fuse into holder and install fuse holder caps by turning them clockwise.

Step 4. Close hinged cover and secure by engaging two 1/4-turn fasteners with a clockwise turn.

(4) COPY LAMP REPLACEMENT.

CAUTION

THE ELECTRICAL CHASSIS IS FREE TO SLIDE OUT OF THE CASE UPON REMOVAL OF THE FRONT COVER.

Step 1. To remove front cover, loosen two fastener studs, pull top toward front approximately 1/2-inch, and then pull entire assembly up and away from case.

Step 2. Compress plastic lamp diffusers to disengage diffuser tabs from electrical chassis cutouts. Remove lamp diffusers.

Step 3. Depress defective copy lamp, turn counterclockwise, and remove from socket.

Step 4. Insert new lamp in socket, depress and turn clockwise 1/4-turn.

Step 5. To permit insertion of diffuser tabs in electrical chassis cutouts, compress plastic lamp diffusers.

Step 6. To install front cover, engage electrical chassis locking device, press down, push top into position, and then engage two fastener studs with a 1/4-turn clockwise.

b. OPERATING CHECK AND ADJUSTMENTS. - Operating checks and adjustments are those which must be made during normal operations in order to maintain overall efficiency of the teletypewriter set.

(1) RANGE CALIBRATION CHECK AND ADJUSTMENT. - Due to variations in signal line distortion, it may be necessary to check range calibration several times during any given day. Check range according to Paragraph 2-8d(2). Adjust range, if necessary.

c. PREVENTIVE MAINTENANCE. - If an Organizational Maintenance Program is in effect, refer to operator's checkoff list for preventive maintenance routine check.

TABLE 3-2. SUMMARY OF OPERATING PROCEDURES

STEP NO.	OPERATION	ACTION
1	Prepare for operation.	Ascertain that equipment has been correctly installed and is ready for operation.
2	Start equipment	Set MOTOR and LAMP switches to ON.
3	Check operating adjustments.	Refer to Paragraph 3-6b for adjustment procedures; perform adjustments if required.
4	Select operating condition.	Set SEND.REC/REC switch to proper position (up for both send and receive; down for receive only).
5	Perform following on-line (both send and receive) functions as required:	NOTE On-line functions are performed upon receipt of a signalled input as opposed to off-line functions which are performed on the local unit only without the benefit of a signalled input.
	a. Print numbers and punctuation marks when selected key is depressed.	Depress FIGS key.
	b. Print letters when selected key is depressed.	Depress LTRS key.
	c. Advance paper.	Depress LINE FEED key.
	d. Return print cylinder and hammer to left side.	Depress CAR RET key (automatic line feed should also be activated).
	e. Repeat last transmitted character.	Depress REP key. (When keyboard interlock is operable the REP key is disabled and it is necessary to repeatedly depress same key.
	f. Obtain space between characters.	Depress space bar.
	g. Interrupt transmission from remote station.	Push BREAK push button switch.
	h. Ring bell at both local and remote stations.	Depress FIGS key and then S key.
	i. Stop motor at remote stations having FIGS H motor stop.	Depress FIGS key and then H key.
	NOTE Teletypewriter Set AN/UGC-41 and Teleprinter Sets AN/UGC-40 and AN/UGC-38 are provided with electronic time delay motor stops that automatically shut off the equipment after 60 to 120 seconds if signal line remains in steady mark condition	

TABLE 3-2. SUMMARY OF OPERATING PROCEDURES (Cont)

STEP NO.	OPERATION	ACTION
	j. Restart motor at both local and remote stations.	Push BREAK button switch.
6	Perform following off-line functions, as required:	NOTE Off-line functions are performed on the local unit only without the benefit of an incoming signal as opposed to On-line functions which are performed upon receipt of a signalled input.
	a. Provide shift to letters on local printer.	Depress off-line letter button (↓) while receiving intelligence. (Off-line letters button will not operate unless intelligence is being received by printer.)
	b. Provide shift to figures on local printer.	Depress off-line figures button (↑).
	c. Provide carriage return on local printer.	Depress off-line carriage return button (<).
	d. Provide line feed.	Depress off-line feed button (≡).
7	Change line feed rate.	Move LINE FEED shift arm to single (six lines per inch) or double (three lines per inch) position, as required.
8	Stop equipment.	Set MOTOR and LAMP switches to OFF.

SECTION 4

THEORY OF OPERATION

4-1. INTRODUCTION.

This section contains principles of operation for Teletypewriter Set AN/UGC-41, and Teleprinter Sets AN/UGC-38 and AN/UGC-40. Paragraph 4-2 describes the overall functioning of the equipment in the two modes of operation: off-line local mode, and on-line mode. Paragraph 4-3 describes the electrical and mechanical theory of each functional section of the teletypewriter set.

NOTE

> The AN/UGC-41 is a send-receive equipment, and the AN/UGC-38 and AN/UGC-40 are receive only units. Discussion will be keyed to the AN/UGC-41 to illustrate the send function.

4-2. OVERALL FUNCTIONAL DESCRIPTION.

a. GENERAL. - Figure 4-1 is a simplified block diagram showing the functional arrangement of the major assemblies of the teletypewriter set. Module board 1A3 consists of a dual range line sensor, line sensor power supply, and electronic time delay motor stop.

b. OVERALL OPERATION. - Electrical chassis 1A1 routes the incoming and outgoing signals and distributes primary power to the appropriate assemblies. The ac line sensor power supply furnishes a dc signal line current source for off-line (local mode) operation. The dc signal line is floating in respect to the chassis.

Keyboard TT-532/UG(1A4) functions as a switching device for the generation of intelligence pulses. Depressing a key or the space bar establishes a code bar position which represents the pulse train to be transmitted to the remote printer or the local printer. The coded pulse train shown in Figure 4-2 represents the letter D, which has a signal code combination of space (no current) pulses on start, 2, 3, and 5 and mark (current) pulses on 1, 4, and stop. For further information on the signal code combinations, refer to Figure 1-2.

Upon receipt of a sequential signal, the line sensor functions as an electronic switch and switches the start pulse, the five intelligence pulses, and the stop pulse to a magnetic selector in the printer. The magnetic selector converts the intelligence pulses to mechanical functions which operate a system of clutch release fingers to release the clutches on the printer mainshaft. These clutches operate cams and linkages which perform all mechanical and printing functions to reproduce the received intelligence pulses.

When the pulse train ceases, a steady mark pulse will remain while the signal is applied to the equipment and the signal loop remains closed. Under this steady mark condition, the printer does not perform any mechanical functions and operates in a closed-loop condition.

During this mark condition, the electronic time delay motor stop is energized and will shut the motor off within 120 seconds after receipt of the mark pulse, if there has been no space pulse introduced and the time-delay-motor-stop switch is in the ENABLE position. If, however, the space pulse is introduced and a steady space condition exists, the printer will be in open-loop state and printer motor will continue to run.

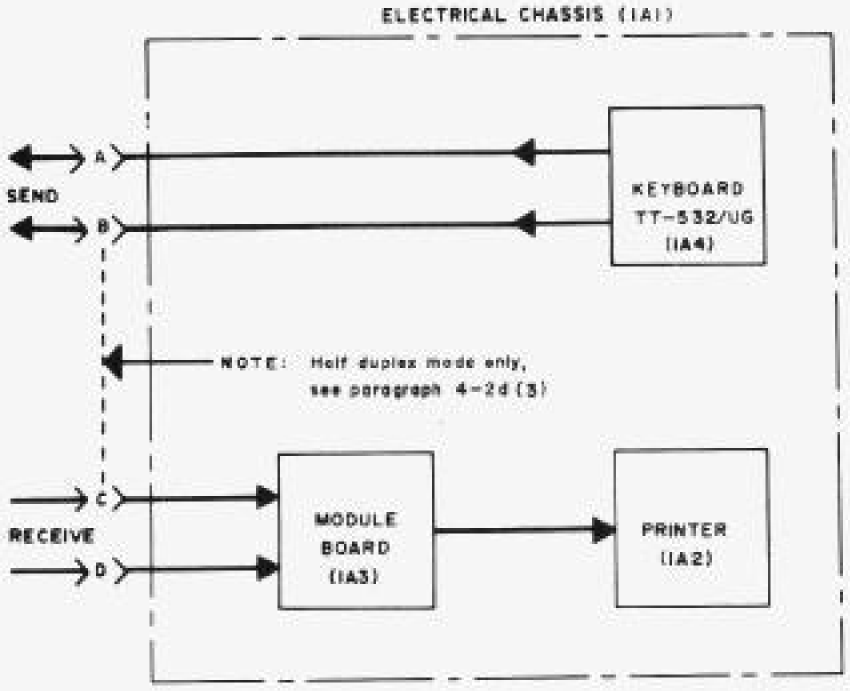


Figure 4-1. Teletypewriter, Simplified Block Diagram (On-line, full duplex)

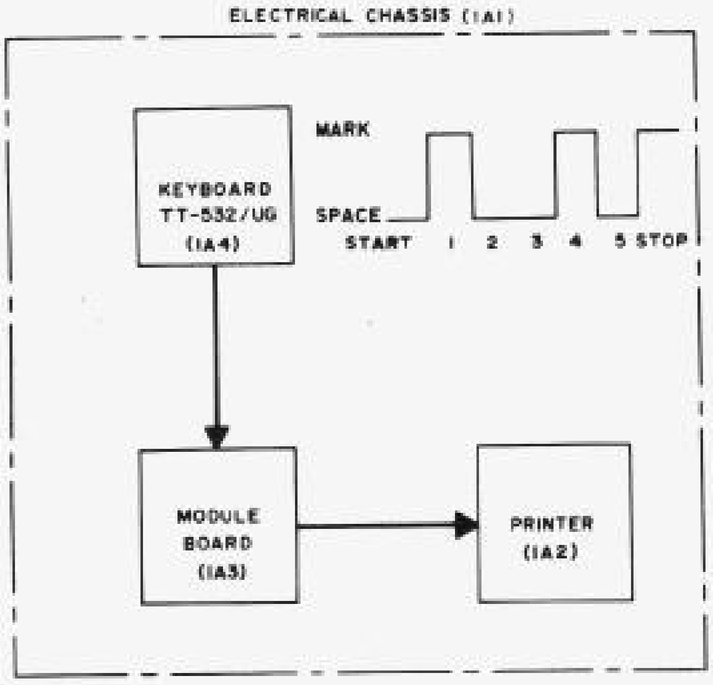


Figure 4-2. Off-Line Local Mode, Block Diagram

c. OFF-LINE LOCAL MODE (See Figure 4-2). - The teletypewriter functions as an electric typewriter in the off-line local mode, requiring only connection to a 115vac, 60 cycle, single phase primary power supply. While in this mode, d-c current for the signal loop is supplied by the line sensor power supply.

NOTE

> The discussion of Full-Duplex and Half-Duplex modes is applicable to Teletypewriter Set AN/UGC-41 only. Teleprinter Sets AN/UGC-38 and AN/UGC-40 are capable of receive only operation in that they have no transmitting capability.

d. ON-LINE MODES (full duplex). - On-line mode operation (Figure 4-1) requires a send and a receive signal loop, permitting simultaneous sending and receiving operations. Signal line current must be supplied externally in these modes.

(1) ON-LOW MODE. - The ON-LOW mode is a full-duplex mode for operating signal line currents of 2.5 to 10MA.

(2) ON-HIGH MODE. - The ON-HIGH mode is a full-duplex mode for operating signal line current of 20 to 80 MA.

(3) HALF-DUPLEX MODE. - Half-duplex operation, which provides (monitoring) home copy, can be accomplished in one of two manners: the unit can be patched externally on the ships patching panel by connecting the signal lines to pins A and D and shorting pins B and C of the signal connector (1A1J1), or when it is anticipated that half-duplex mode will be utilized on a continuing basis, the signal lines can be brought in on pins A and D and a shorting strap soldered across pins B and C of the signal connector (1A1J1). When patched in this manner, it is still necessary to correctly position the rotary mode switch for HIGH or LOW current operation, defined in Paragraphs 4-2d(1) and 4-2d(2).

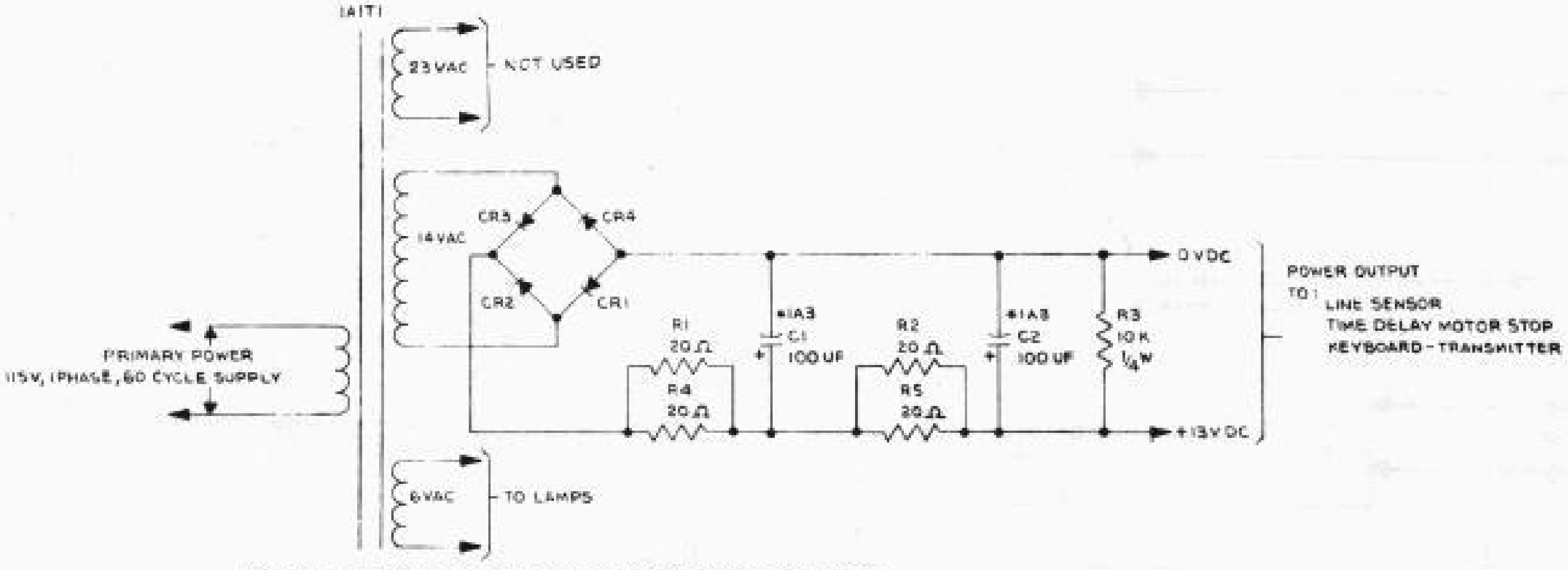
4-3. FUNCTIONAL DESCRIPTION BY SECTION.

a. INTRODUCTION. - The operation of the individual functional sections forming the teletypewriter set is described in the following paragraphs. The arrangement of these descriptions approximates the signal path through the equipment: power supply, keyboard, dual range line sensor, and printer. Each assembly is described independently for ease of reference.

b. LINE SENSOR POWER SUPPLY. - The line sensor power supply (See Figure 4-3) functions as a source of voltage and current for proper internal operation of the line sensor module only. The power supply is capable of supplying 13 vdc at 100 ma. The power supply is electrically isolated from the chassis so that the output of the supply is above ground (floating ground). The input to the power supply is 115 vac, 60 cycles, single phase. Power transformer 1A1T1 has multiple windings consisting of one winding which supplies power to the line sensor (14 vac), a second winding to supply power to the copy lamps (6 vac), and a third winding, although not used now, could be used to supply current for an internal signal line power supply. The 14 vac output of the secondary winding is fed to a signal orientation bridge comprised of diodes CR1 through CR4. The rectified voltage is then filtered by resistor capacitor filter networks consisting of R1, R4, C1; R2, R5, and C2. The load resistor R3 serves as a stabilizer to adjust for any variations in load and tends to maintain a constant d-c output of 13 vdc. Resistor R3 also functions as a discharge path for energy stored in capacitors C1 and C2 when input power is removed or power supply output is disconnected.

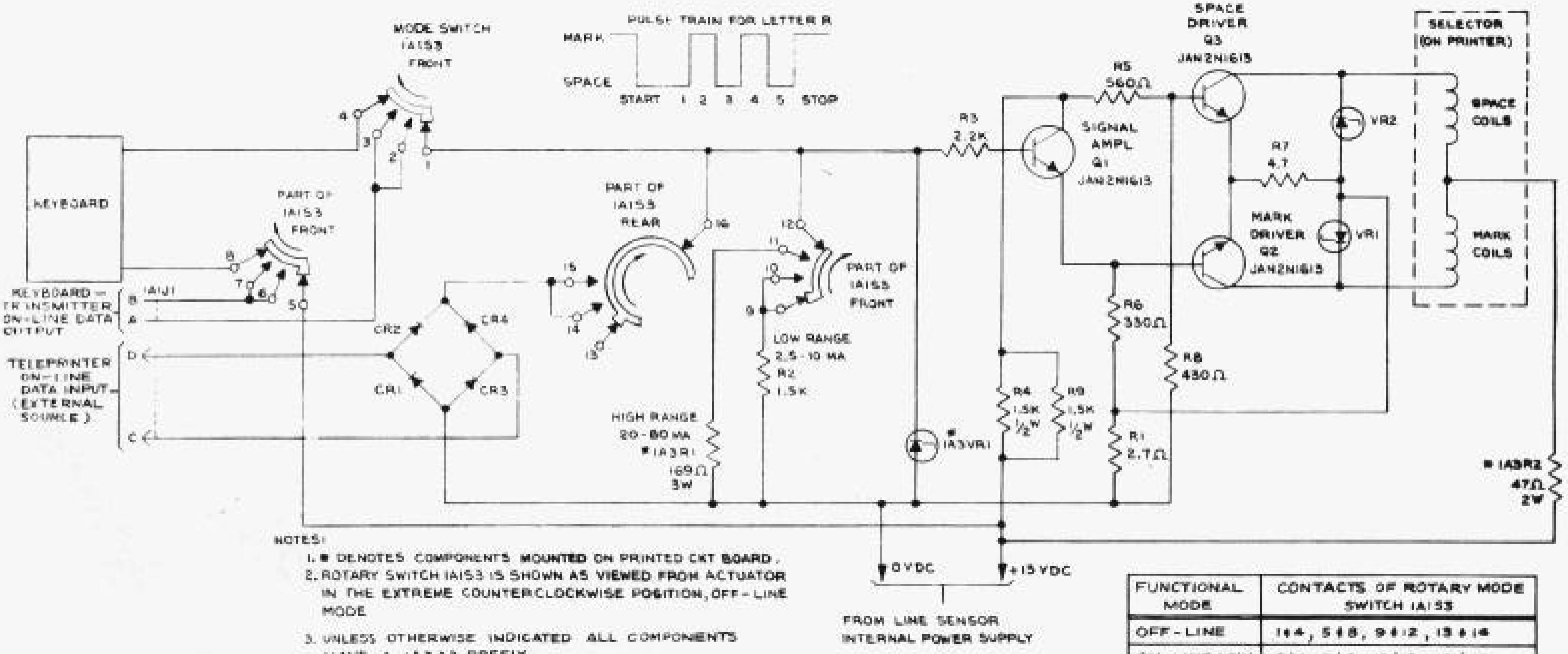
c. DUAL RANGE LINE SENSOR. - The dual range line sensor (see Figure 4-4) consists of a signal orientation bridge to orient the polarity of the incoming signal from the on-line terminals when mode switch 1A1S3 is in the on-line position. Transistor Q1 functions as a switch to actuate either mark driver (amplifier) Q2, or the space driver (amplifier) Q3 to drive the respective mark and space coils of the magnetic selector.

The signal orientation bridge receives d-c pulses (of either positive or negative polarity) from the signal source and orients the pulse polarity so that only negative pulses appear at the base of transistor Q1. Transistor Q1 functions as a switch to control



NOTES: 1. * INDICATES COMPONENTS MOUNTED ON PRINTED CKT BOARD
2. UNLESS OTHERWISE INDICATED ALL RESISTORS ARE ½ WATT

Figure 4-3. Line Sensor Power Supply (1A3A2), Schematic Diagram



NOTES:

1. * DENOTES COMPONENTS MOUNTED ON PRINTED CKT BOARD.
2. ROTARY SWITCH 1A1S3 IS SHOWN AS VIEWED FROM ACTUATOR IN THE EXTREME COUNTERCLOCKWISE POSITION, OFF-LINE MODE
3. UNLESS OTHERWISE INDICATED ALL COMPONENTS HAVE A 1A3A3 PREFIX
4. UNLESS OTHERWISE INDICATED ALL RESISTORS ARE ¼ WATT

FUNCTIONAL MODE	CONTACTS OF ROTARY MODE SWITCH 1A1S3
OFF-LINE	1 & 4, 5 & 8, 9 & 12, 13 & 14
ON-LINE LOW	2 & 4, 6 & 8, 10 & 12, 14 & 16
ON-LINE HIGH	3 & 4, 7 & 8, 11 & 12, 15 & 16

Figure 4-4. Dual Range Line Sensor (1A3A2), Schematic Diagram

current to mark and space drivers. In the space condition (no signal current), the space driver Q3, conducts and causes the space coil in the magnetic selector to be energized. The magnetic selector is located in the printer and serves to convert the electrical impulses from the signal line to mechanical movements for selecting the various printing and non-printing functions. A detailed discussion of the line sensor follows, commencing with a mark signal (current) at the input.

The mark signal appears across the input of the signal orientation bridge at the junction of CR1 and CR2, and CR3 and CR4. If the signal current is present, a voltage drop is developed across input resistor 1A3R1 for the 20-80 ma range (high range) or 1A3R2 for the 2.5-10 ma range (low range). This voltage is applied as forward bias to the base-emitter junction of Q1, turning it on. Emitter of Q1 is tied directly to the base of Q2 whose emitter-base junction is normally back-biased through resistors R1 and R7. When Q1 is turned on, it forward biases Q2 which turns it on, allowing current to flow through the mark coil in the magnetic selector. During this period Q3 is being reverse biased through resistors R1 and R7 (the emitter is less positive than its base) and Q3 is off, allowing no current to flow to the space coil in the magnetic selector. Zener 1A3VR1 protects transients or spikes that may appear on the signal line in the form of interference. Zener diodes VR1 and VR2 are placed at the collectors of Q2 and Q3 respectively to prevent inductively produced spikes or pulses at the selector coils exceeding 24 volts from appearing on the collectors of drivers Q2 and Q3.

In the space condition (no current) there is no voltage drop across the input and the base of Q1 is at 0 volts. The emitter of Q1 is biased to approximately 0.27 volts resulting in a reverse biased-emitter junction causing Q1 to be turned off. At this point, Q2 is also reverse biased because its base is less positive than its emitter, causing Q2 to be turned off. Q3 however, has its emitter common with the Q2 emitter, and the base-emitter junction is forward biased so that Q3 is turned on, energizing the space coils.

d. KEYBOARD TT532/UG(1A4) for AN/UGC-41 ONLY.

(1) MECHANICAL FUNCTIONS. - Keyboard TT532/UG(1A4) (Figure 4-5) consists of a keyboard drive gear (coupled to the printer motor), a drive shaft which rotates continuously as long as the motive power is applied, a clutch mechanism coupled to a set of five code pulsing cams, code pulsing contacts, master pulsing cam, contacts, and a set of five code bars which set up the mechanical code appropriate to the selected character of function.

The clutch, which is mounted on the drive shaft (Figure 4-5) consists of two housings, a cage, four rollers, two bias compression springs, and two spacers. The housings and the cage are connected by four rivets and two spacers so that the housings are rigidly connected and the cage is free to rotate approximately 10 degrees around the drive shaft in relation to the housings. Bias compression springs, between the cage and the spacers separating the

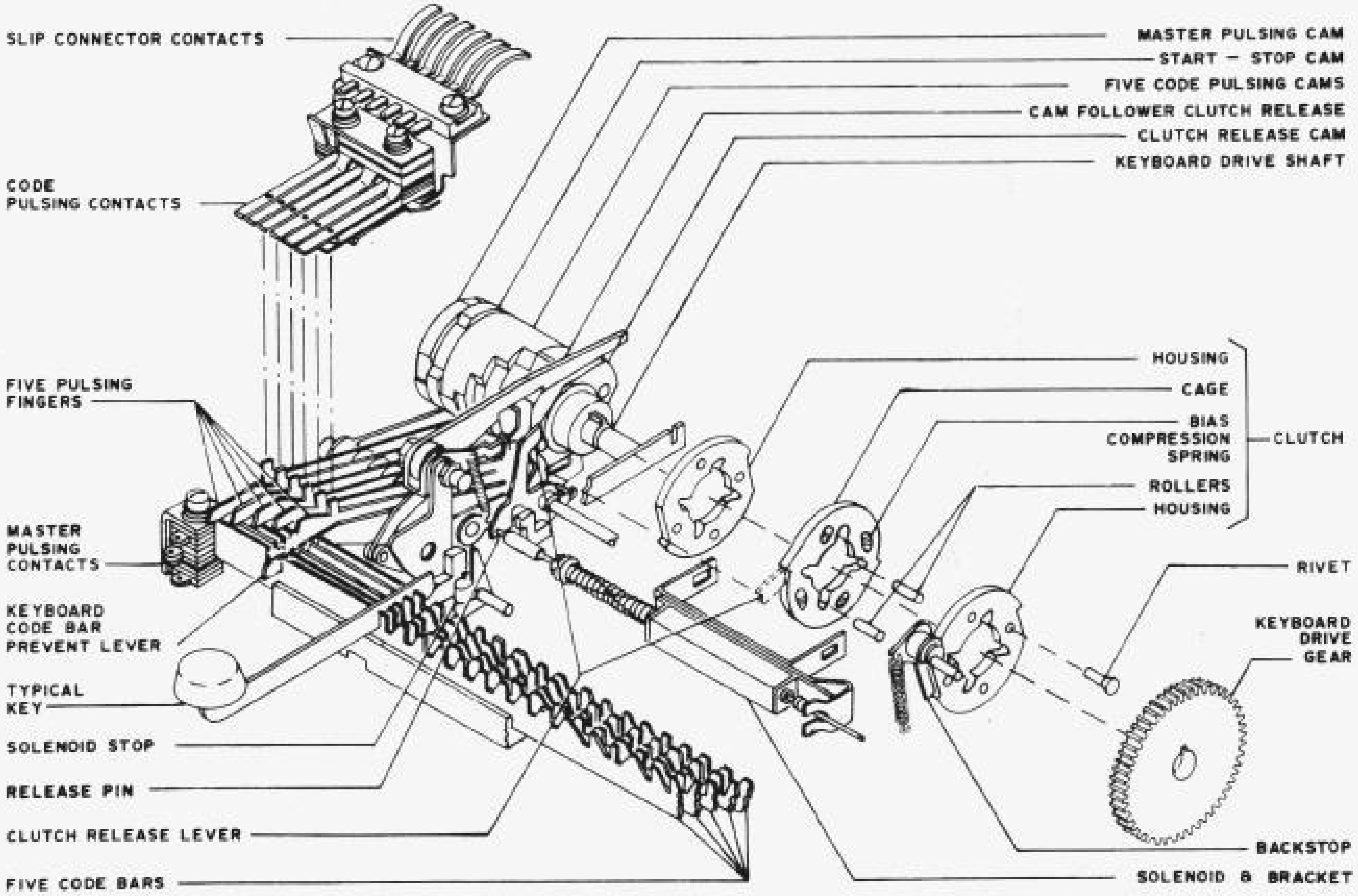


Figure 4-5. Keyboard TT532/UG(1A4), Mechanical Diagram

housings, bias the cage in the direction of clutch rotation. The four rollers pass through the four slots in the cage and both housings. The slots in the cage fit around the rollers and permit the rollers to travel the length of the slots. The ends of the slots in the housings contain close-fitting sloped surfaces which, when the clutch is engaged, restrict the motion of the rollers in such a manner as to force the rollers against the drive shaft.

When the clutch release disengages the stop tab on the cage, the cage is moved forward by the bias compression springs. This motion cams the rollers down on the drive shaft and the clutch rotates with the drive shaft. This initial camming action is reinforced by the jamming action exerted on the rollers by the sloped surfaces in the housing. The clutch will rotate 180 degrees until one of the two cage stop tabs engages the clutch release. At this point, the forward motion of the cage will be stopped and the camming and jamming action of the rollers against the drive shaft will cease, resulting in the clutch being disengaged.

At the instant the cage is halted by the clutch release, the bias compression springs will tend to push the housings backward, thus reestablishing the camming effect. If unrestrained, this backward motion will result in the clutch chattering. Consequently, backstops are provided to prevent any backward motion of the clutch.

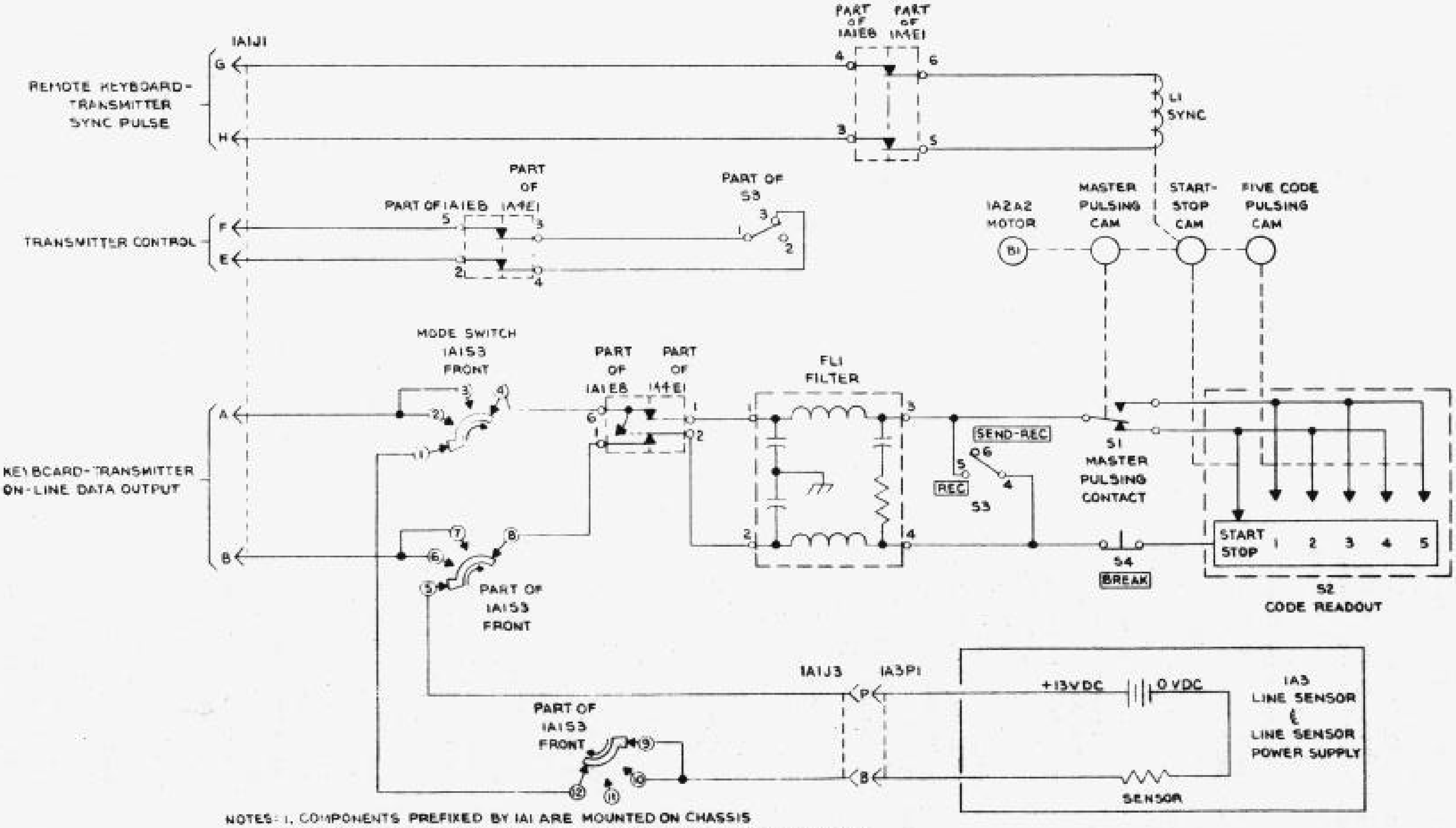
Depression of any key, positions the keyboard code bars, storing the intelligence for that key depressed and mechanically locks out all other keys. Upon receipt of a synchronous pulse, the interlock solenoid actuates the clutch release lever, releasing the keyboard clutch. The stored intelligence is then transmitted and the keyboard code bars are released, enabling the next character to be set up. Prior to receipt of this pulse, a spring loaded release pin remains positioned under the clutch release lever, preventing the release of keyboard clutch and cam assembly. Key depression is not possible because the prevent lever has locked the code bars, preventing any movement until receipt of the next pulse. The pulse energizes the interlock solenoid and retracts release pin. The clutch release lever assembly pivots release keyboard clutch and cam assembly which allows the last intelligence set up on the code bars to be transmitted. During transmission time, motive power is also applied to the five code pulsing cams, the stop-start cam, and the master pulsing cam. Depression of a key releases the code bar lock lever, which falls into one of two adjacent slots in each code bar, locking the code bars in place during the character or function generating cycle. The five-level code set up by the code bars is converted into a pulse train by five code pulsing cams, five cam followers, and five sets of code pulsing contacts. The stop-start cam actuating another set of pulsing contacts through a cam follower, signals the beginning and end of the character transmitting cycle.

Depression of any key moves the clutch bail downward, pulling the clutch release cam follower, actuate lever, release lever link, and release lever assembly to the front of the printer. Release lever assembly clears tab on prevent lever, releasing the prevent lever so that it can ride on the cam. This movement permits sufficient pivoting of the clutch release lever to allow release of clutch when the next synchronous pulse is received. Receipt of a pulse allows the transmission of intelligence through keyboard operation and the lack of a pulse to the keyboard effectively locks out the local equipment from the signal loop.

The code pulsing contacts are connected in series with the signal loop through the keyboard slip contacts. When the stop-start cam follower moves downward, the associated stop-start pulsing contacts are closed resulting in a steady mark condition. Rotation of the stop-start cam at the beginning of the character cycle causes the stop-start cam follower to open the code pulsing contacts and transmit a start or space pulse. Rotation of the five code pulsing cams acts on the associated cam followers which actuate the five code pulsing contacts. Some of the code bars extend under the cam follower extensions and may stop the extension from dropping, depending upon the positioning of a code bar under the cam follower. When a code bar does not restrict the downward motion of a cam follower, the associated set of code pulsing contacts is closed and transmits a mark pulse. The blocking of a cam follower by a code bar holds the set of code pulsing contacts open, causing a space pulse to be transmitted. The cam follower normally holds the pulsing contacts open except when the cam follower drops into the cam for a mark pulse. The master pulsing contacts comprise a single-pole, double-throw switch which is alternately switched from one side to the other by the master pulsing cam follower and master pulsing cam. When the switch is in the first position, the code pulsing contacts used for transmitting the stop-start, 2, and 4 pulses are connected in the circuit; in the other switch position, the pulsing contacts used for transmitting pulses 1, 3, and 5 are switched into the circuit. The gap through which the master pulsing contacts oscillate is adjusted to obtain the effect of simultaneously switching one circuit out and the other circuit in. In this manner, the six individual code pulsing contacts handle a minimum amount of current with the master pulsing contacts switching the greater amount, since the six individual pulse contacts close early and open late. The effect of this arrangement is to have six code pulsing contacts determine the presence or absence of a code pulse while the master pulsing contacts oscillate between the stop-start, 2, and 4 circuit and the 1, 3, and 5 circuit, accurately timing the duration of pulses in each circuit.

As the 180 degrees of clutch rotation ends, the code bar lock lever is moved out of the code bar slots by the clutch release lever cam and the clutch is disengaged by the stop tab on the cage engaging the clutch release. If the REP (repeat) key is depressed when the synchronous pulse solenoid is disabled, the clutch release will be held back from engaging the cage by the action of the repeat key lever shaft. As a result, the clutch will remain engaged and apply motive power to the code pulsing cams, retransmitting the last code combination set up on the code bars. This cycle will be repeated continuously as long as the repeat key is held down.

(2) ELECTRICAL FUNCTIONS. (See Figure 4-6)- The keyboard circuit is shown, the keyboard slip contacts and the chassis-mounted signal line shorting contacts separated. The keyboard slip contacts (shown in Figure 4-6 as part of 1A1E8) and the automatic signal line shorting contacts are so constructed as to close the signal loop when the keyboard is not



NOTES: 1. COMPONENTS PREFIXED BY 1A1 ARE MOUNTED ON CHASSIS
2. COMPONENTS PREFIXED BY 1A3 ARE PART OF ELECTRONIC MODULE ASSY
3. ROTARY SWITCH 1A1S3 IS SHOWN AS VIEWED FROM ACTUATOR IN THE EXTREME COUNTERCLOCKWISE POSITION, OFF-LINE MODE

Figure 4-6. Keyboard TT532/UG(1A4), Simplified Schematic Diagram

in the operating position, thus preventing the loop from remaining open.

In this circuit, the signal loop is completed from the negative side of the signal line power supply (in off-line condition only) through the signal line shorting contact, keyboard slip contact, filter FL1, master pulsing contacts S1, code readout S2, BREAK switch S4, keyboard slip contact, signal line shorting contact (B), and through the input resistance of the line or load device back to the signal line power supply.

The contact filter is used to suppress arcing across the switching contacts and to minimize interference with nearby radio equipment. The master pulsing contacts are used to switch current between the set of pulsing contacts that develops stop-start, 2, and 4 pulses, and the set of contacts for 1, 3, and 5 pulses. The BREAK switch is connected in series with the switching circuit and if depressed will open the signal loop, interrupting transmission. The SEND-REC/REC switch is connected across the master pulsing contacts, code pulsing contacts, and the BREAK switch. When this switch is in the SEND/REC position, the operator may either send or receive, since the code pulsing contacts are in the circuit to be used as required. In the REC position, the pulsing contacts and the BREAK switch are shorted out, resulting in a closed signal loop, effectively shorting out the output of the keyboard.

e. MOTOR STOP (See Figure 4-7). - When the signal loop is not active, a steady mark (current) signal line condition exists, and the line sensor remains in the mark condition. Current flows through the mark driver (amplifier) Q2 in the line sensor, and does not flow through the space driver (amplifier) Q3, of the line sensor. The collector of Q2 is at a potential of approximately + 7.5 volts with respect to the 0 vdc reference. Because of the current flow through a common resistor leg, the cathode of CR1 will be at + 7.5 vdc. Since one end of R7 is connected to the anode of CR1 and the other end to the +13 vdc buss, CR1 will be forward biased and the junction of CR1, R7, and CR4 will be at approximately +8 vdc. This +8 vdc is enough to forward bias CR4, CR8, and the base-emitter junction of Q2 and Q3. As a result of this forward biased condition, Q2 and Q3 will be turned on. The emitter of Q3 is biased through three diodes, CR2, CR5, CR6, and the resistor R4 to approximately +2.4 vdc. When Q2 and Q3 are turned on, their common collector will be at a potential of approximately +3.5 vdc (approximately 1 volt drop appearing across the collector to emitter junction of Q3). This +3.5 vdc is also applied to the negative terminal of C3, and C3 will begin to charge to +13 vdc through R1 and R6. At a voltage (charge level) of approximately +9 volts at the junction of R6, R1, and the base of 1A3Q1 the emitter break-over voltage of Q1 (a unijunction transistor) is accomplished and Q1 will begin to conduct. The emitter to the b_1 junction of Q1 is representative of a negative resistance, and as current through it increases, the resistance decreases. The decreasing resistance now offers a low impedance path through which capacitor 1A3C3 may discharge. Transistor 1A3Q1 acts as an amplifier and merely amplifies the current that flows to the uni-junction transistor Q1. Using the transistor 1A3Q1 as an amplifier permits the use of R1 in a larger value. When current flows through junction b_1 of Q1, a portion of the current will be diverted through R3, and another portion to the gate of 1A3Q2, a silicon controlled rectifier (SCR). The current through R3 produces a voltage drop across it, and this voltage is applied between the gate and cathode of the SCR. The combination of this voltage between the gate and cathode of the SCR and the current flowing in the gate, turns the SCR on. Current now flows through the SCR energizing the motor stop relay 1A1K1, which in turn removes primary power from the motor by opening contacts 3 and 5 of relay 1A1K1. When capacitor C3 discharges to a level of approximately 5 volts through the base-emitter junction of 1A3Q1 and the emitter-b_1 junction of 1A3Q2, the emitter-b_1 junction will once again assume the blocking state and as long as Q2 and Q3 are turned on, C3 will once again start to charge to the breakover voltage level. By the nature of its operation, the SCR will stay on and 1A1K1 will remain energized until either the anode or the cathode circuit of the SCR is opened. Once turned on, the gate no longer has any control over the SCR.

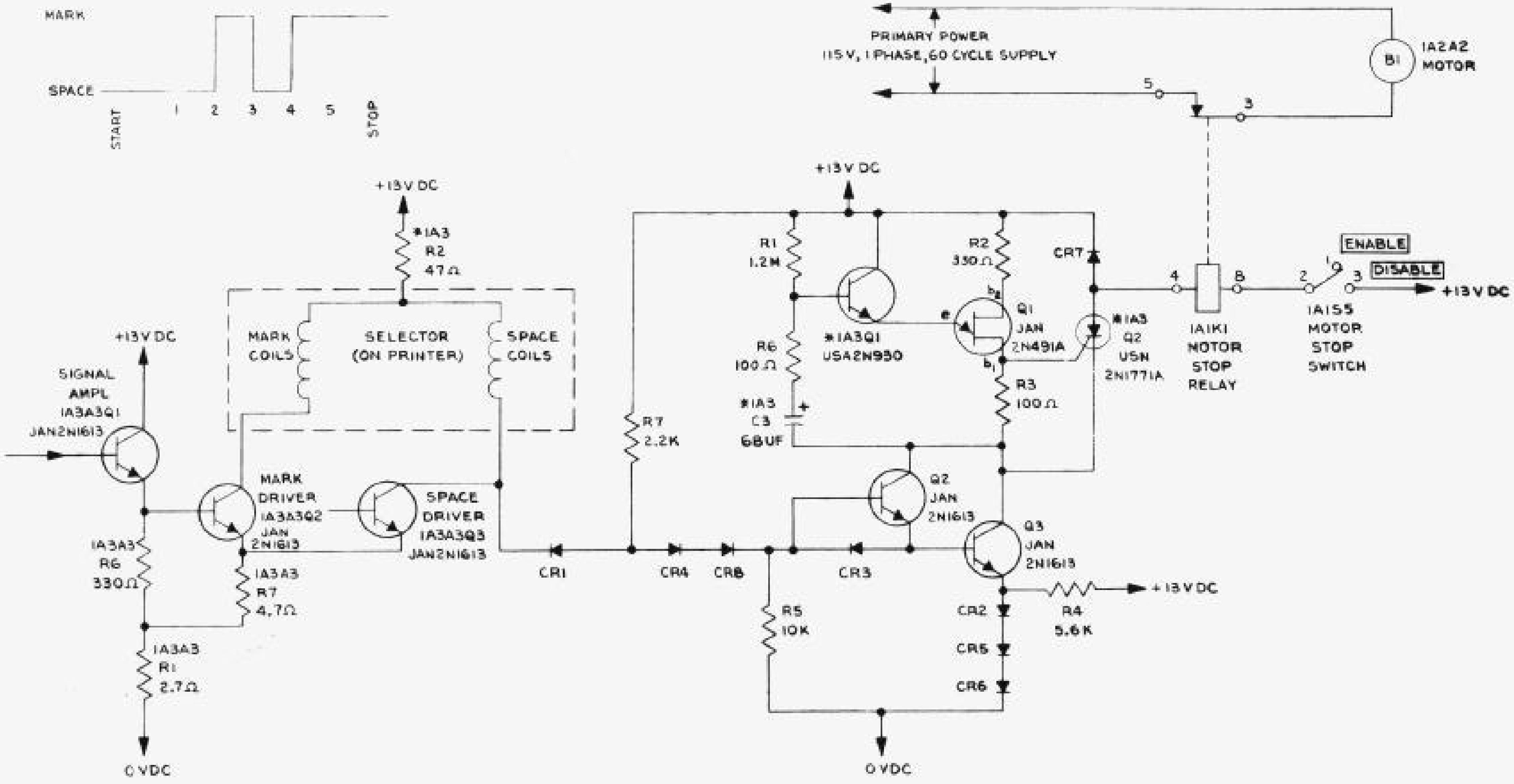
If Q2 and Q3 are left in the conducting state for a long period of time, Q1 will continue to fire periodically, however, its operation will have no effect on the SCR since this device is latched in the on position.

When the signal line is open, (a space condition) Q2 of the line sensor shuts off, and Q3 of the line sensor turns on. The collector of Q3 is at a potential of approximately +1.1 volts; therefore, the cathode of CR1 will be at +1.1 volts. CR1 will again be forward biased through R7, however, the junction of CR1, CR7, and CR4 will be held at approximately +1.7 volts. Since the emitter of Q3 is at approximately +2.4 vdc, this voltage is not enough to forward bias CR4, CR8, and the emitter-base junction of Q2 and Q3, therefore, they will not conduct (turn off), effectively opening the cathode circuit of the SCR. With SCR cathode open, it shuts off, and current will no longer flow through the SCR anode and the coil of 1A1K1.

In subsequent operation, every time a mark signal is transmitted, Q2 and Q3 of the motor stop are on, and C3 begins to charge. Capacitor C3 will only charge to the break-over point provided the mark signal is sustained for approximately 60 to 120 seconds.

f. PRINTER 1A2. - A magnetic selector incorporated in the printer receives d-c current impulses from the dual range line sensor (space and mark pulses) and converts these pulses into the mechanical motions required to couple various clutches to a continuously rotating mainshaft. The magnetic selector starts the character printing cycle and all other functions with the start pulse and then translates each of the five intelligence pulses to start all mechanical functions in the printer. Upon receipt of the stop pulse, the magnetic selector holds the stop-start clutch in the stop condition until receipt of next space (start) pulse. Figure 4-8 provides a general concept of how all mechanical functions in the printer are selected. These functions will first be discussed on a block diagram basis, and then each functional system will be described in detail.

(1) BLOCK DIAGRAM DISCUSSION. (See Figure 4-8) - The magnetic selector first receives a d-c impulse representing start (space). This pulse energizes a set of solenoid coils which attract the armature that the start clutch release arm releases the



NOTES: 1. * DENOTES COMPONENTS MOUNTED ON PRINTED CKT BOARD
2. UNLESS OTHERWISE INDICATED ALL RESISTORS ARE 1/4 WATT

Figure 4-7. Electronic Time Delay Motor Stop (1A3A1), Simplified Schematic Diagram

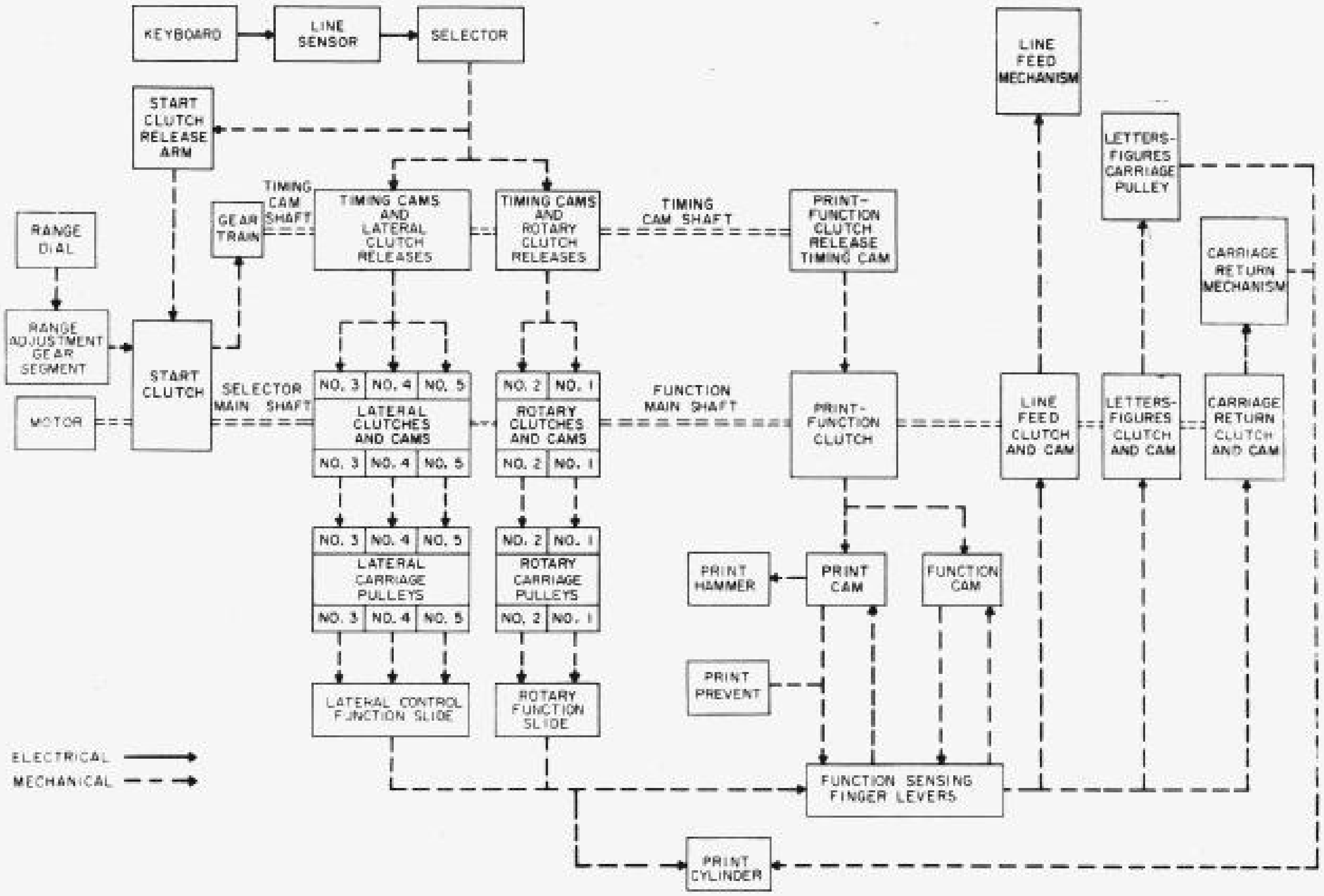


Figure 4-8. Printer (1A2), Functional Block Diagram

start clutch mounted on the printer mainshaft. The mainshaft consists of two sections; a selector mainshaft and a function mainshaft. The two shaft sections are coupled together and rotate as one shaft. All mechanical functions begin on the selector mainshaft. When released by the start clutch release arm, the start clutch engages the selector mainshaft for 180 degrees rotation. The clutch disengages the selector mainshaft when the cage stop tab is blocked by the start clutch release latch. With a steady mark signal (stop pulse), operation of the start clutch release arm is blocked by the magnetic selector armature and the start clutch is held stationary by the start clutch and subsequent sampling of the intelligence pulses is manually adjusted by a range dial geared to the start clutch. The start clutch is also gear-coupled to a timing camshaft assembly which times the magnetic selector clutch release functions in relation to the pulse train. A set of timing cams on the timing camshaft time the operation of the clutch release fingers which release rotary and lateral clutches on the selector mainshaft. The magnetic selector samples the five intelligence pulses and by energizing space or mark solenoid coil sets, mechanically locks or unlocks the clutch release fingers that release (engage) the rotary and lateral clutches. The release fingers are only permitted to release their associated clutches when their timing cams are not positioned in accordance with the start clutch function. The timing function is required to set up the individual clutches as their respective pulse is received.

During rotation of the timing camshaft (which rotates 360 degrees to every 180 degrees of the mainshaft rotation) one finger of each pair of clutch release fingers is free to operate and correctly position its respective clutch and cam assembly. Prior to completion of the clutch and cam assembly positioning cycle, the print cam (which is attached to the function cam) is released, regardless of the combination of pulses received.

The selector mainshaft accommodates a start clutch, two rotary clutches and three lateral clutches, numbered in accordance with the intelligence pulse that controls its position. Number one and number two intelligence pulses have the effect of positioning the rotary clutches in one of two 180-degree positions as determined by mark or space pulses. These clutches position pulley carriages which, by means of mechanical linkage, position the type cylinder in one of four 45-degree positions, or on one of four rows of type. A letters-figures pulley carriage is used to rotate the type cylinder to any one of two 180-degree positions representing letters or figures. The rotary pulley carriages also position a rotary slide in the function selector.

Lateral clutches 3, 4, and 5 (operated from intelligence pulses 3, 4, and 5), operating in conjunction with the three lateral pulley carriages, also position the lateral slide in the function selector. The two slides, which move laterally with respect to one another, select mechanical functions such as blank, space, line feed, figures, bell, letters, and carriage return. Each slide has various slots arranged so that the proper combination of pulses will align a pair of slots in both rotary and lateral slides and permit a sensing finger to fall into the slots and perform the selected mechanical function.

The function selector can be considered as a positioning servo operating in a closed loop. It receives mechanical positioning information from the rotary and lateral pulley carriages and senses the information with function selector sensing fingers. If the information is appropriate for the particular mechanical function, such as either letters or figures, it releases a letters-figures clutch on the function mainshaft. Release of the letters-figures clutch positions a letters-figures pulley carriage. Movement of the letters-figures pulley carriage determines in which 180-degree position (letters or figures) the type cylinder will be positioned. In addition to moving the type cylinder laterally to select any character in a row of eight characters, the lateral pulley carriages are also used in conjunction with the lateral slide and the function sensing fingers to release the line feed and the carriage return clutches when these functions are selected.

Release of the function-print clutch rotates a function cam and print cam. The function cam follower, when on the high part of the cam, allows the sensing fingers to determine when two slots are in alignment on the rotary and lateral slides and then select the function to be performed. On the downward motion of the function cam follower, all sensing fingers are deflected and cammed away from the function slides by the function bar, thus freeing the slides to move to the next position during the subsequent cycle. If a function selection is accomplished by the sensing fingers, the printing which would normally follow is prevented. When the print cam is free to act on the print hammer, printing is accomplished. The print hammer is moved in a lateral direction across the copy paper and in front of the type cylinder through action of the carriage return, takeup drum, and advance drum systems.

(2) MAGNETIC SELECTOR MECHANISM. (See Figure 4-9) - The magnetic selector mechanism, mounted at the back of the printer, receives pulse information from the dual range sensor. The magnetic selector consists of two armature and solenoid coil sets facing in opposite directions. Each armature set contains four solenoid coils connected so that like magnetic poles are diagonally opposite. The selector operates in polar fashion, using two sets of series coils for space and two sets for series coils for mark. In this manner, recovery time is reduced and the armature sets are mechanically divided so that the right armature set is controlled by stop-start, 2, and 4 pulses, and the left armature set is controlled by pulses 1, 3, and 5. Energizing either the space or mark coils positions the armature so that it blocks the inward motion of either the space or mark paddle.

Figure 4-10 shows a section of the magnetic selector with a pair of clutch release fingers bearing on the mark and space paddles. There are six clutch assemblies on the selector mainshaft of the printer, each controlled by its respective pulse (Figure 4-8).

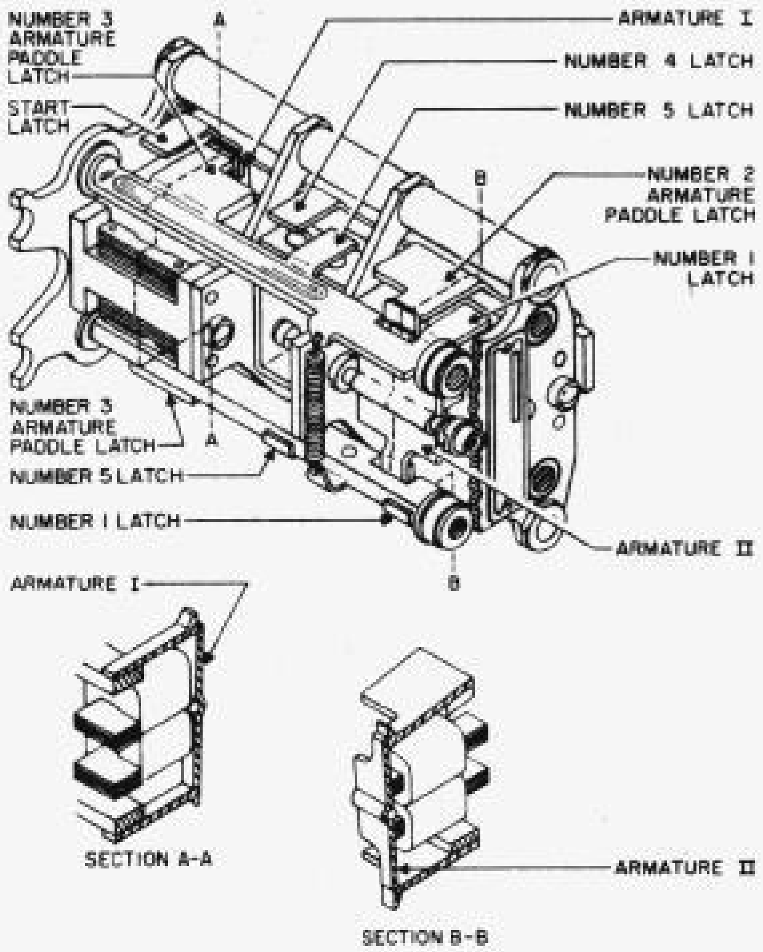


Figure 4-9. Magnetic Selector Mechanism

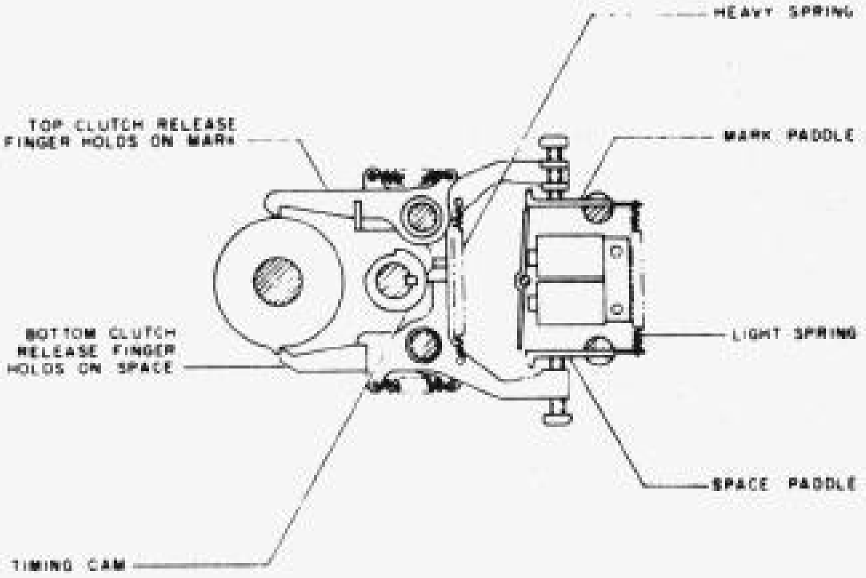


Figure 4-10. Magnetic Selector Clutch Release Mechanism

In operation, the clutch release fingers (Figure 4-10) press down on the paddles or latches under spring pressure greater than that required to pull the paddles away from the armature. The release fingers are free to press on the latches or paddles by the simultaneous positioning of the timing cam and the receipt of the appropriate intelligence pulse. If a clutch release finger is not blocked by the timing cam or armature, it will press downward on a latch or paddle. The top clutch release finger holds on a mark pulse and the bottom clutch release finger holds on a space pulse. When a space pulse arrives, the armature is pulled in toward the space solenoid and permits the mark paddle to be pressed downward by the top clutch release finger adjustment screw, thereby releasing the clutch on the mark side. When energized, the mark solenoid pulls the armature in at the top and releases the bottom clutch release finger (space side). Release of a clutch on either side allows the clutch to engage the selector mainshaft and rotate 180 degrees where it is stopped by the opposite clutch release finger.

(3) START CLUTCH RELEASE SYSTEM. (See Figure 4-11) - During receipt of a steady mark signal (stop pulse), the start latch, mounted on the same shaft as paddle 2, locks the start clutch release arm in the stop position. When locked, the start clutch release arm holds the clutch release latch against the clutch stop tab and the backstop lever rests in the cut-out in the start clutch restoring cam. When a start pulse is received, the spring-loaded start clutch release arm moves down, pulling the clutch releases latch away from the clutch stop tab and thus releases the clutch for 180-degrees rotation. As the rotation of the clutch cams the backstop lever out, the clutch release latch is moved back down to the stop position and the release arm is simultaneously moved out and away from the magnetic selector. As the clutch stop tab moves around to complete its 180-degrees rotation, it is engaged by the release latch and backstop lever and held in position until the next start pulse is received. The backstop lever, which is adjustable to prevent clutch chatter, then drops into the start clutch restoring cam cut-out. To permit manual adjustment of the timing cycle or the time relationship between the start of the timing camshaft and sampling of the intelligence pulses, a range dial is provided. Adjusting this dial orients the timing cam shaft in the most favorable position in relation to the incoming pulse train. Timing dots are incorporated to ensure proper relationship of start clutch to timing camshaft during reassembly of printer.

(4) PRINTER MAINSHAFT CLUTCH AND CAM ASSEMBLY. (See Figure 4-12) - The printer mainshaft consists of the selector mainshaft on the left side of the printer (facing the front) and the function mainshaft on the right side. Mainshaft power is supplied by the printer motor through gear (19, Figure 4-12) on the function mainshaft. The keyboard mechanism receives motive power from gear (3) on the selector mainshaft; the timing camshaft receives motive power from gear (6), which is attached to the start clutch.

The selector mainshaft contains, from left to right, keyboard drive gear (3), range gear sector (2), bearing retainer (4), start clutch cam backstop (1), start clutch release adjustment screw (5), timing camshaft and ribbon feed drive gear (6), number 3 lateral clutch and B cam (7), number 4 lateral clutch and C cam (8), number 5 lateral clutch and D cam (9), number 2 rotary clutch and E cam (11), and number 1 rotary clutch and F cam (12). The clutch and cam assemblies are identified by a stamped capital letter.

The function mainshaft (see Figure 4-12), from left to right, contains function-print clutch and G and H cam (14), line-feed clutch and I cam (15), letters-figures clutch and J cam, carriage return clutch and K cam (17), and third reduction gear (19). The cams of these clutches also have capital letters stamped on them for identification. These clutches are not released directly through the action of the magnetic selector as are the selector mainshaft clutches, but are released when a particular function is selected by the function selector. The function-print clutch and cam assembly consists of a clutch which may be rotated to one of two positions (representing function or print) and two cams designated as a function cam and a print cam. The clutch is released by a function-print clutch release timing cam mounted on the timing cam shaft (Figure 4-8). The

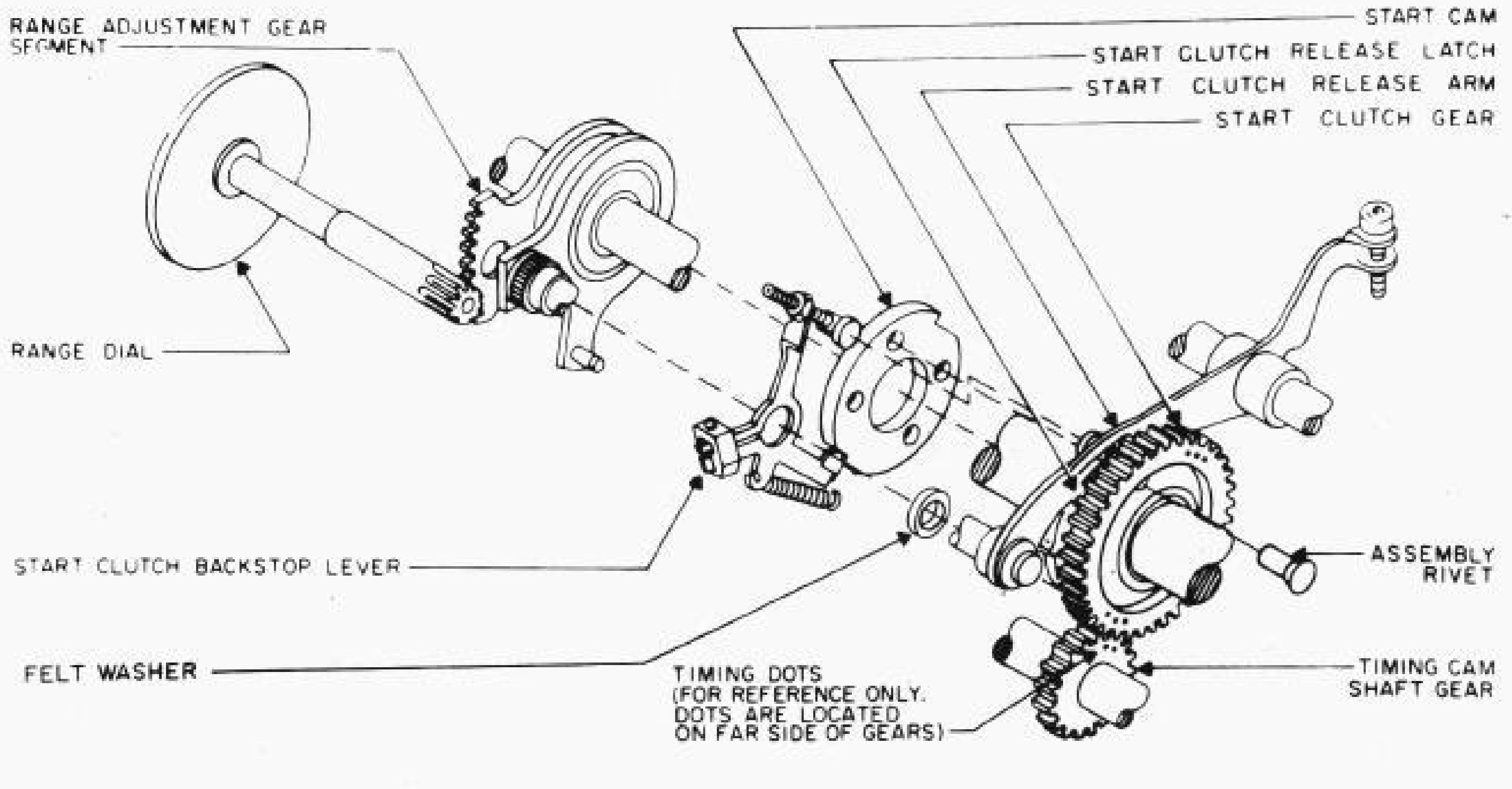
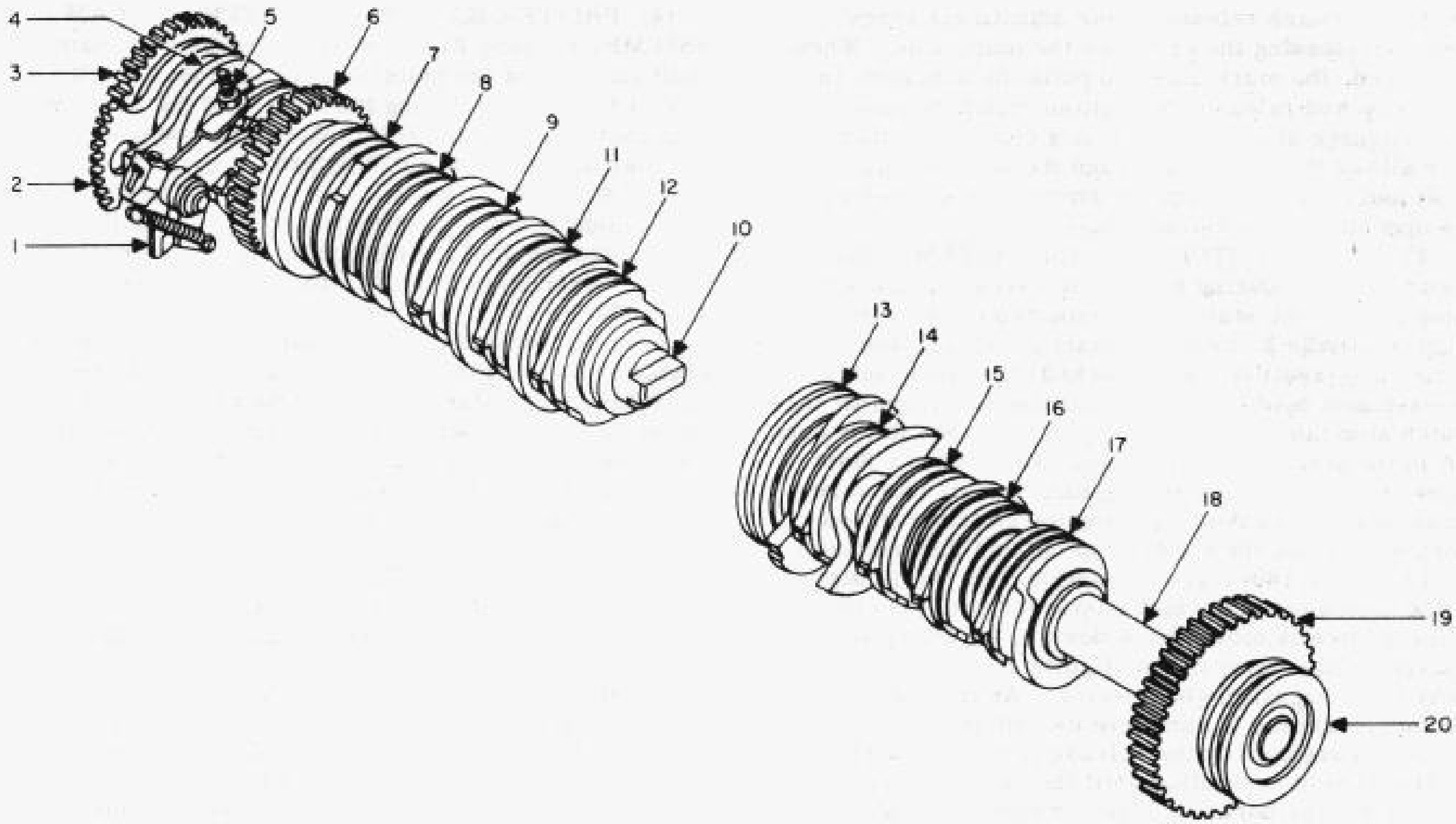

RANGE ADJUSTMENT GEAR SEGMENT
START CAM
START CLUTCH RELEASE LATCH
START CLUTCH RELEASE ARM
START CLUTCH GEAR
RANGE DIAL
START CLUTCH BACKSTOP LEVER
ASSEMBLY RIVET
FELT WASHER
TIMING DOTS (FOR REFERENCE ONLY. DOTS ARE LOCATED ON FAR SIDE OF GEARS)
TIMING CAM SHAFT GEAR

Figure 4-11. Start Clutch Release Mechanism



KEY	ITEM	KEY	ITEM
1	Start Clutch Cam Backstop	10	Selector Mainshaft Assembly
2	Range Gear Sector	11	No. 2 Rotary Clutch and E Cam
3	Keyboard Drive Gear	12	No. 1 Rotary Clutch and F Cam
4	Bearing Retainer	13	Bearing
5	Start Clutch Release Adjustment Screw	14	Function-Print Clutch and G and H Cam
6	Timing Camshaft Drive Gear and Ribbon Feed Drive Gear	15	Line Feed Clutch and I Cam
7	No. 3 Lateral Clutch and B Cam	16	Letters-Figures Clutch and J Cam
8	No. 4 Lateral Clutch and C Cam	17	Carriage Return Clutch and K Cam
9	No. 5 Lateral Clutch and D Cam	18	Function Mainshaft Assembly
		19	Third Reduction Gear
		20	Bearing

Figure 4-12. Printer (1A2) Mainshaft Assembly

function cam starts the mechanical function selection cycle and the print cam operates the print hammer. The line feed clutch and cam assembly operates the line feed mechanism when line feed is commanded. The letters-figures clutch and cam assembly moves a cam follower and pulley carriage to position the type cylinder in one of two 180-degree positions, representing either letters or figures. The carriage return clutch and cam assembly is used to return the type cylinder and print hammer to the left margin.

(5) TYPE CYLINDER POSITIONING SYSTEM. (See Figure 4-13) - The coding of the incoming signal, as interpreted by the magnetic selector mechanism, determines the position of the five type cylinder positioning cams and their corresponding cam followers. Each cam follower can be left in one of two positions by its positioning cam as follows:

Number 1 Pulse Cam: High side for Mark/Low for Space

Number 2 Pulse Cam: High side for Mark/Low for Space

Number 3 Pulse Cam: Low side for Mark/High for Space

Number 4 Pulse Cam: Low side for Mark/High for Space

Number 5 Pulse Cam: Low side for Mark/High for Space

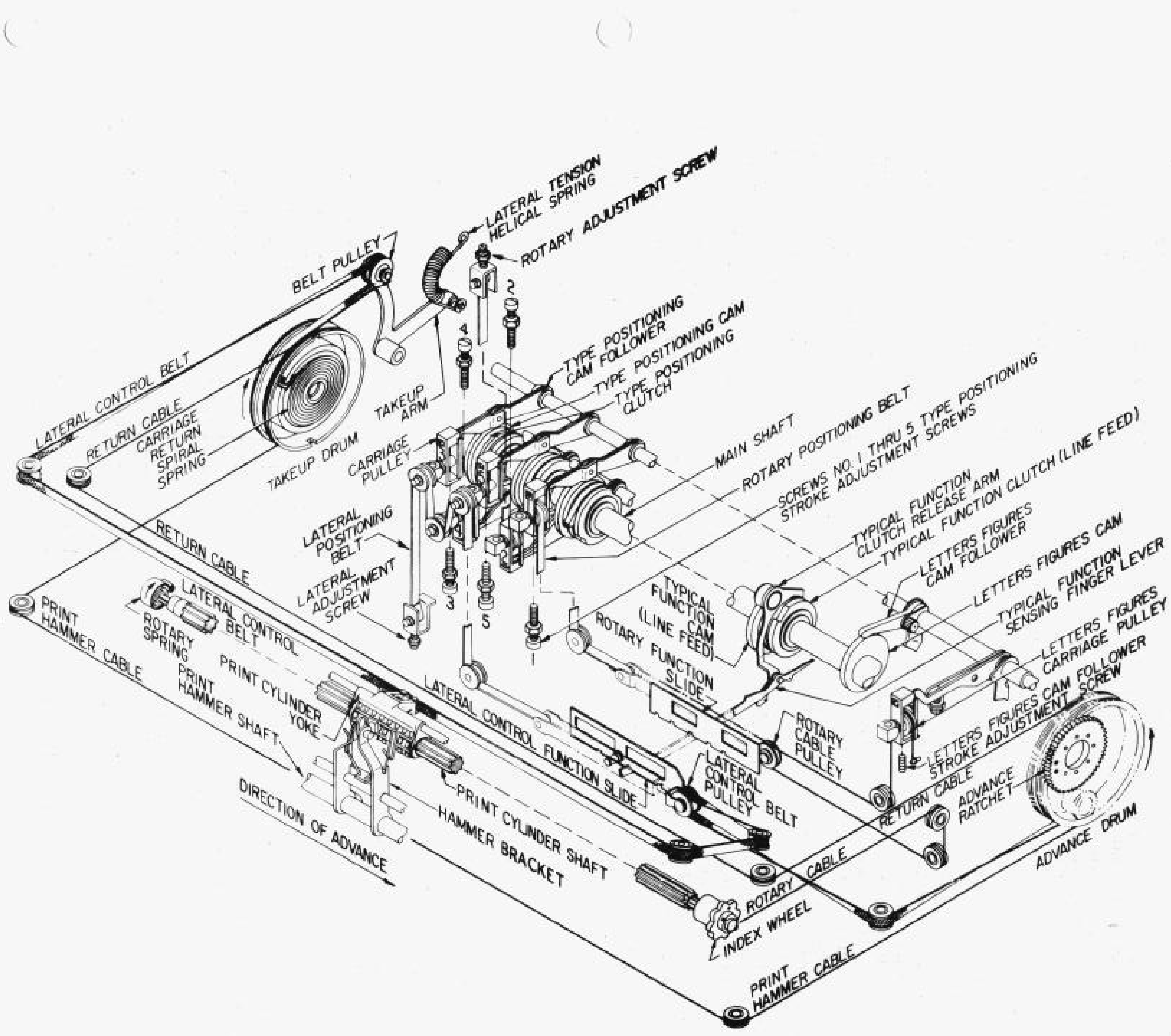


Figure 4-13. Type Cylinder and Print Hammer Positioning System

When the letter A is commanded (mark pulse on 1 and 2, and space on 3, 4, and 5) all of the cam followers will be positioned on the high portions of their respective cams. Upon command of the letter M (space on 1 and 2, and mark on 3, 4, and 5), all of the cam followers will be on the low portions of their respective cams. Since each of the cam followers is connected to a pulley carriage (Figure 4-13) the high and low positioning of the cam followers positions the pulley carriages. The positioning belts that pass through the pulley carriages, therefore, are effectively lengthened and shortened by the motion of the cam followers. In practice, carriages number 1 and 2 control motion of the rotary positioning belt and carriages 3, 4, and 5 control motion of the lateral positioning belt.

In both the rotary and lateral systems, the various cam followers move different preset distances, allowing four possible combinations in the rotary system and eight combinations in the lateral system. Figure 4-14 illustrates the units of travel accomplished by each pulley carriage and how the various combinations can be established.

(a) ROTARY MOTIONS OF TYPE CYLINDER. - As shown in Figure 4-13, the effect of the combination of number 1 and 2 pulses is transmitted through the rotary positioning belt, rotary slide, and rotary cable to the end of the shaft to which the type cylinder is keyed. The cylinder shaft is turned in one direction by the rotary spring and in the other by the rotary cable pulling against the spring. The stroke of pulley carriage number 1 is 3/32 inch and the stroke of pulley carriage number 2 is 3/64 inch. The stroke of the number 2 pulley is exactly half that of number 1 pulley, so that four evenly spaced rotary positions are possible as follows:

ROTARY POSITION	CAM FOLLOWER POSITION 1	CAM FOLLOWER POSITION 2	EFFECTIVE LENGTH OF ROTARY CABLE RELATIVE TO FIRST POSITION IN INCHES
I	High	High	First position
II	High	Low	3/16 longer
III	Low	High	3/8 longer
IV	Low	Low	3/16 longer

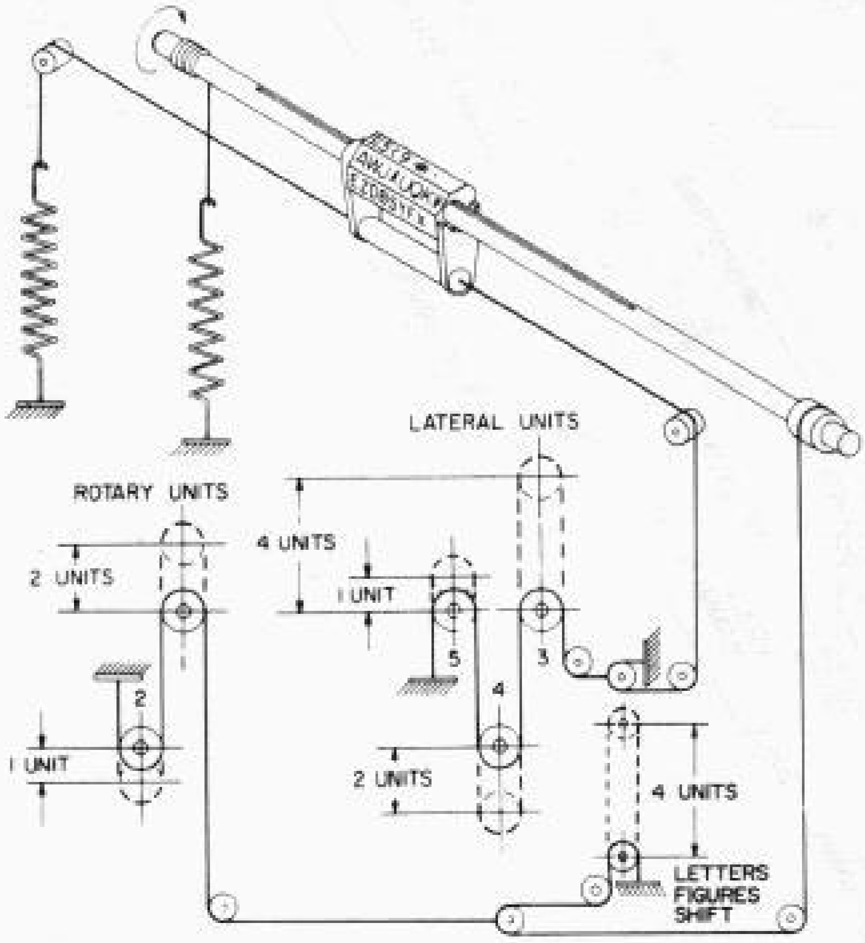
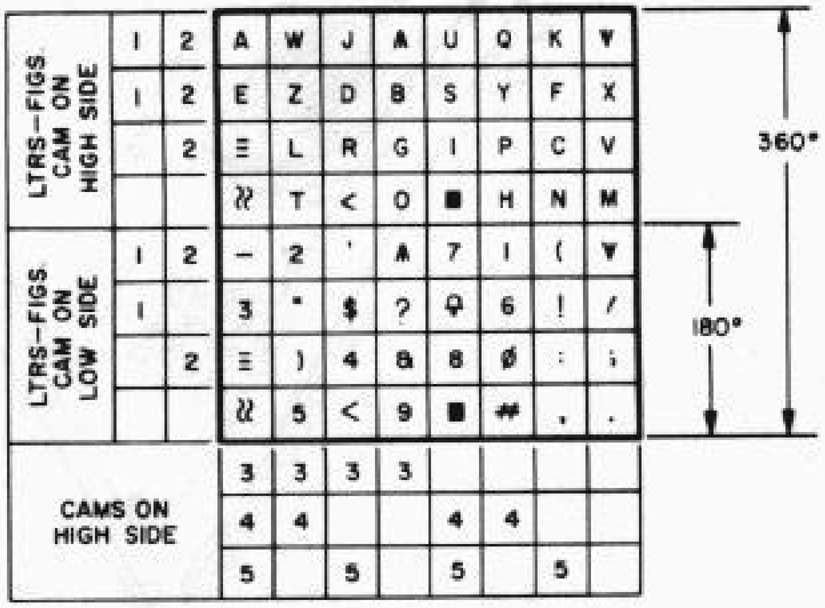


Figure 4-14. Type Cylinder Positioning Mechanism

The developed view of the type cylinder (Figure 4-15) shows the eight vertical (rotary) type cylinder positions. Four of the eight rotary positions correspond to letters; the other four correspond to figures. The letters-figures cam follower and pulley system, as the pulley is moved to the high position for letters and low for figures, determines within which group of four rows the subsequent rotary positioning will take place. The stroke of the pulley, through which the rotary cable passes, positions the type cylinder so that the subsequent selection will be within one of the two 180-degree segments of the cylinder.

(b) LATERAL MOTIONS OF TYPE CYLINDER. - The lateral motions of the type cylinder are similarly transmitted from the lateral positioning belt (Figure 4-13) through the connecting shaft, lateral slide, and the lateral belt to the type cylinder yoke. The actual strokes of the pulley carriages are as follows:

Pulley Carriage Number 3 — 3/16 inch
Pulley Carriage Number 4 — 3/32 inch
Pulley Carriage Number 5 — 3/64 inch



LTRS—FIGS CAM ON HIGH SIDE	1	2	A	W	J	▲	U	Q	K	▼
	1	2	E	Z	D	B	S	Y	F	X
		2	≡	L	R	G	I	P	C	V
			≈	T	<	O	■	H	N	M
LTRS—FIGS CAM ON LOW SIDE	1	2	–	2	'	▲	7	1	(	▼
	1		3	"	$	?	♀	6	!	/
		2	≡	)	4	&	8	0	:	;
			≈	5	<	9	■	#	,	.
CAMS ON HIGH SIDE			3	3	3	3				
			4	4			4	4		
			5		5		5		5	

Figure 4-15. Type Cylinder, Developed View

Here again, the stroke for number 4 is twice that of number 5 and the stroke for number 3 is twice that of number 4 so that eight lateral positions are possible as follows:

	CAM FOLLOWER POSITION			EFFECTIVE LENGTH OF LATERAL CABLE RELATIVE TO FIRST POSITION IN INCHES
LATERAL POSITION	3	4	5	
I	High	High	High	First position
II	High	High	Low	3/16 longer
III	High	Low	High	3/8 longer
IV	High	Low	Low	9/16 longer
V	Low	High	High	3/4 longer
VI	Low	High	Low	15/16 longer
VII	Low	Low	High	1-1/8 longer
VIII	Low	Low	Low	1-5/16 longer

(c) CHARACTER ADVANCE AND CARRIAGE RETURN. - Character advance is achieved by moving the type cylinder and print hammer space-by-space across the page. When the end of the line is reached, the type cylinder and hammer are returned to the left side of the page.

As shown in Figure 4-13, the lateral belt, hammer cable, and return cable originate in the advance drum. The advance drum is rotated by the action of a pawl on the advance ratchet. As the advance drum rotates counterclockwise, the hammer cable and lateral belt advance the hammer and type cylinder toward the right side of the page, tightening the spring in the takeup drum. This advance continues across the page until, at a preset point, the advance ratchet and pawl system releases the advance drum and the spring-loaded takeup drum returns the type cylinder and hammer to the left side of the page. The return cable serves to counteract the effects of inertia during carriage return by combining the rapid clockwise motion of the advance drum with corresponding counterclockwise motion of the takeup drum.

(d) ISOLATION OF TYPE CYLINDER MOTIONS. - In the lateral direction, the type cylinder (paralleled by the print hammer) is subject to simultaneous motions consisting of character advance (step-by-step) motions and type positioning motions. In addition, the type cylinder is subjected to two distinct rotary motions; the letters-figures selection motions and the discrete type positioning motions. Since simultaneous lateral or simultaneous rotary motions may be occurring, some method of isolation between these motions must be employed.

The lateral selection motions of the type cylinder are completely isolated from the step-by-step advance and carriage return motions by interposing the lateral transfer pulley (Figure 4-13) between the advance drum and the type cylinder to introduce lateral selection motion, and by interposing the takeup arm pulley between the type cylinder and the takeup drum to bias the lateral selection motion of the type cylinder.

The rotary motions (letters-figures and type positioning) of the type cylinder are completely isolated by interposing the rotary transfer pulley (Figure 4-13) between the letters-figures cam follower and the type cylinder shaft, and the use of a rotary spring on the end of the type cylinder shaft.

(e) OPERATION OF TYPE CYLINDER POSITIONING CAMS. - The magnetic selector interprets the sequence in which each of the five intelligence pulses is received and converts this series of electrical signals into mechanical motion. This is done by controlling the release of the type cylinder positioning cam clutches. Figure 4-16 illustrates the system of clutch release fingers, clutches, and cams controlled by the magnetic selector.

The system consists of a driven mainshaft to which each of the type cylinder positioning cam clutches and the start clutch are capable of being coupled. The pair of release fingers straddling each clutch are capable of controlling the coupling of that clutch to the mainshaft, and consequently of positioning the clutch in one of two 180-degree positions, corresponding to a marking or spacing pulse.

Each clutch is held in its mark or space position by one of the two release fingers straddling it. Consequently, if in successive character cycles a given intelligence pulse is the same as in the previous cycle, the corresponding clutch remains stationary. For example, in a repeated RY combination, all clutches turn 180 degrees with each new character cycle because the mark and space combinations are exactly opposite for R and Y. In an RQ combination, however, the number 2 clutch will remain motionless because in both R and Q the number 2 is a marking pulse while all other clutches alternate between mark and space in changing from R to Q. (R has marking pulses on 2 and 4. Q has marking pulses on 1, 2, 3, and 5; Y has marking pulses on 1, 3, and 5).

As described in Paragraph 4-3f(2), more than one pair of clutch release fingers can be affected by the selector at one time. This would permit the wrong clutch to react to a specific pulse and would be completely incompatible with the time base concept of a sequential code. Therefore, the individual pairs of clutch release fingers are freed to respond to the selector and release their clutches only during the period when their timing cams permit them to move outwards from the clutch. The timing cams are angularly displaced on a shaft which is gear-coupled to the mainshaft through the start clutch. The first break in the neutral circuit (start pulse) through the selector releases the start clutch for 180 degrees rotation which, through the two-to-one gear ratio, drives the timing camshaft 360 degrees. During this 360-degree turn of the timing camshaft, each pair of clutch release fingers is in turn freed to operate for a period of time corresponding to the time interval of the incoming signal pulses at the appropriate operating speed. The function-print clutch release finger is then freed to operate as the last action of the timing camshaft.

The angular relationship between the timing cams and the stop position of the timing camshaft (the time relationship between the start of the timing camshaft

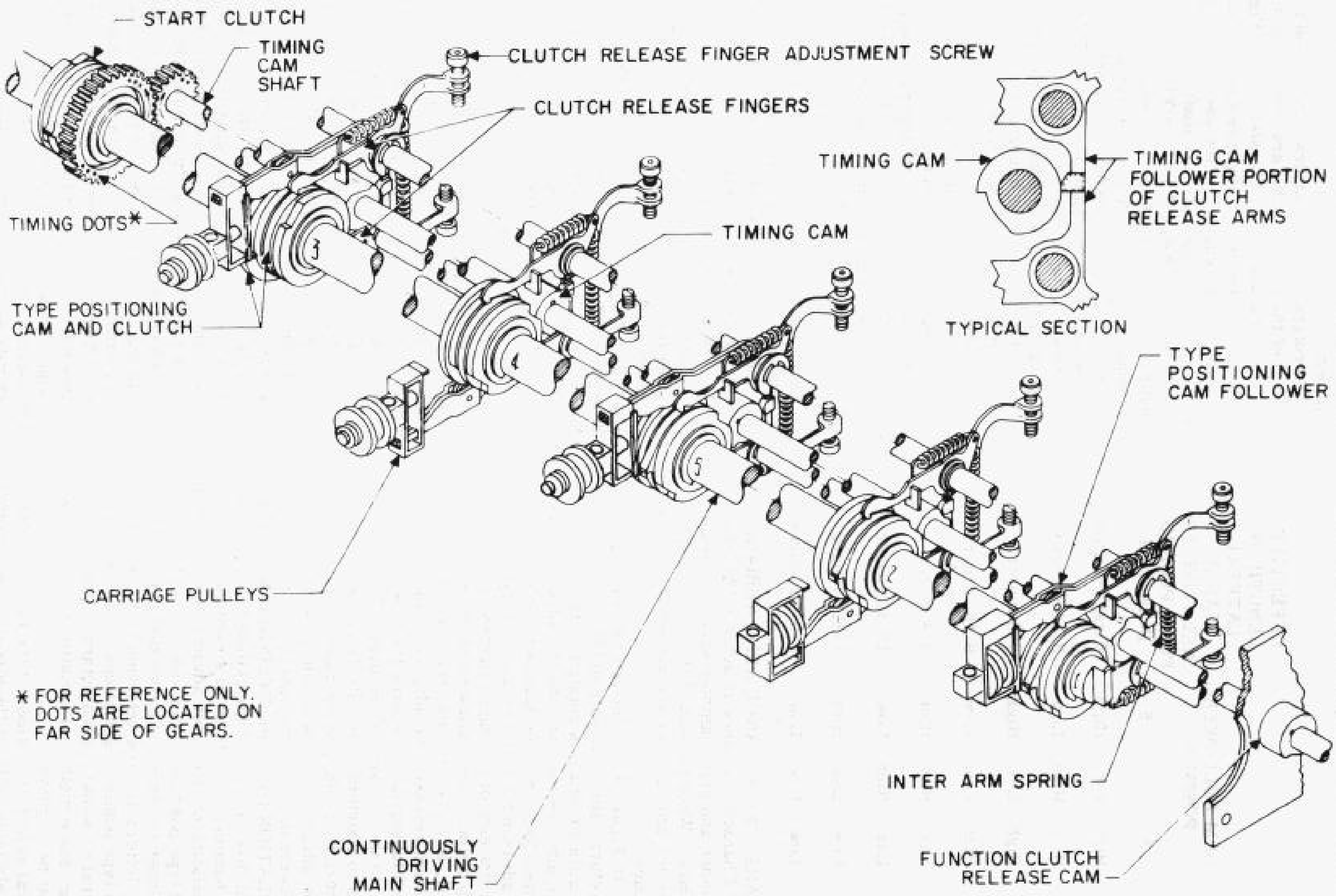

START CLUTCH
TIMING CAM SHAFT
CLUTCH RELEASE FINGER ADJUSTMENT SCREW
CLUTCH RELEASE FINGERS
TIMING CAM
TIMING CAM FOLLOWER PORTION OF CLUTCH RELEASE ARMS
TIMING DOTS*
TIMING CAM
TYPE POSITIONING CAM AND CLUTCH
TYPICAL SECTION
TYPE POSITIONING CAM FOLLOWER
3
4
5
2
CARRIAGE PULLEYS
* FOR REFERENCE ONLY. DOTS ARE LOCATED ON FAR SIDE OF GEARS.
INTER ARM SPRING
CONTINUOUSLY DRIVING MAIN SHAFT
FUNCTION CLUTCH RELEASE CAM

Figure 4-16. Type Cylinder Positioning Clutch Release System

and the sampling of the intelligence pulses) is adjusted by the range dial in order to orient the selector in the best possible position in relation to the condition of the incoming signal. If a distorted signal is received, this mechanism searches for the usable portion of signal. An exploratory check is made for the leading and trailing edges of the usable signal; then the unit is set to the midpoint.

(6) FUNCTION SELECTOR. - As shown in Figure 4-13, the rotary and lateral positioning belts terminate at slotted plates. These plates, which are called rotary and lateral function slides, are used to select mechanical functions as distinguished from the normal printing of a character. The slides are part of the function selector mechanism which serves to sense various mechanical functions and select the particular function to be performed. Through movement of the five pulley carriages (Paragraph 4-3f(5), various combinations of marking and spacing pulses will cause the slides to move in lateral directions in relation to each other.

In figure 4-17, the slots in the rotary and lateral slides are arranged so that a particular combination of pulses will align a pair of slots in the two slides at a point directly opposite a function sensing finger and permit the sensing finger (Figure 4-13) to engage the slots. A sensing finger will engage the two slots only momentarily to sense the mechanical function requested and will then be pushed back and out. A separate function sensing finger is provided for sensing each of the mechanical functions shown in Figure 4-17. After sensing the mechanical function established by positioning the rotary and lateral slides, the function selector engages the appropriate clutch on the function mainshaft to perform the function. The particular combination of incoming pulses required for different functions and the mechanical results are listed in Table 4-1.

The function sensing fingers (Figure 4-18) are spring biased against the slides and consequently will fall into a pair of properly aligned slots if not otherwise prevented. The function bar is supported by two arms and pivots on the function shaft, describing an arc tangent to the edge of the function sensing fingers. The function shaft to which the lifter arm is clamped also supports the function cam follower; therefore, the function spring tends to hold the function cam follower against the function cam.

(a) START OF FUNCTION CYCLE. - In Figure 4-18, the function-print clutch has two cams; a print cam and a function cam. The function-print clutch (on the function mainshaft) is released or engaged at the same time as the number 5 clutch on the selector mainshaft (during every character translating cycle, regardless of the pulse arrangement received). The function-print clutch is released by a clutch release finger operated by the function-print timing cam, which is located on the same timing camshaft as the magnetic selector timing cams.

When the function-print clutch is in the stop position (disengaged from the function mainshaft), the function cam follower is positioned approximately one-third of its movable distance upward on the function cam. Upon its release simultaneously with receiving the number 5 pulse, the function-print clutch and cam combination rotates, moving the function cam follower toward a higher position. This movement rotates the function shaft and raises the function bar lifter arm which in turn raises the function bar beyond the tops of the function sensing fingers, permitting the fingers to fall into any pair of slots (in the rotary and lateral slides) that are aligned by a particular combination of received pulses. During the time the function cam follower is rising on the function cam, positioning of the slides has been completed and the slides are stationary. After a function

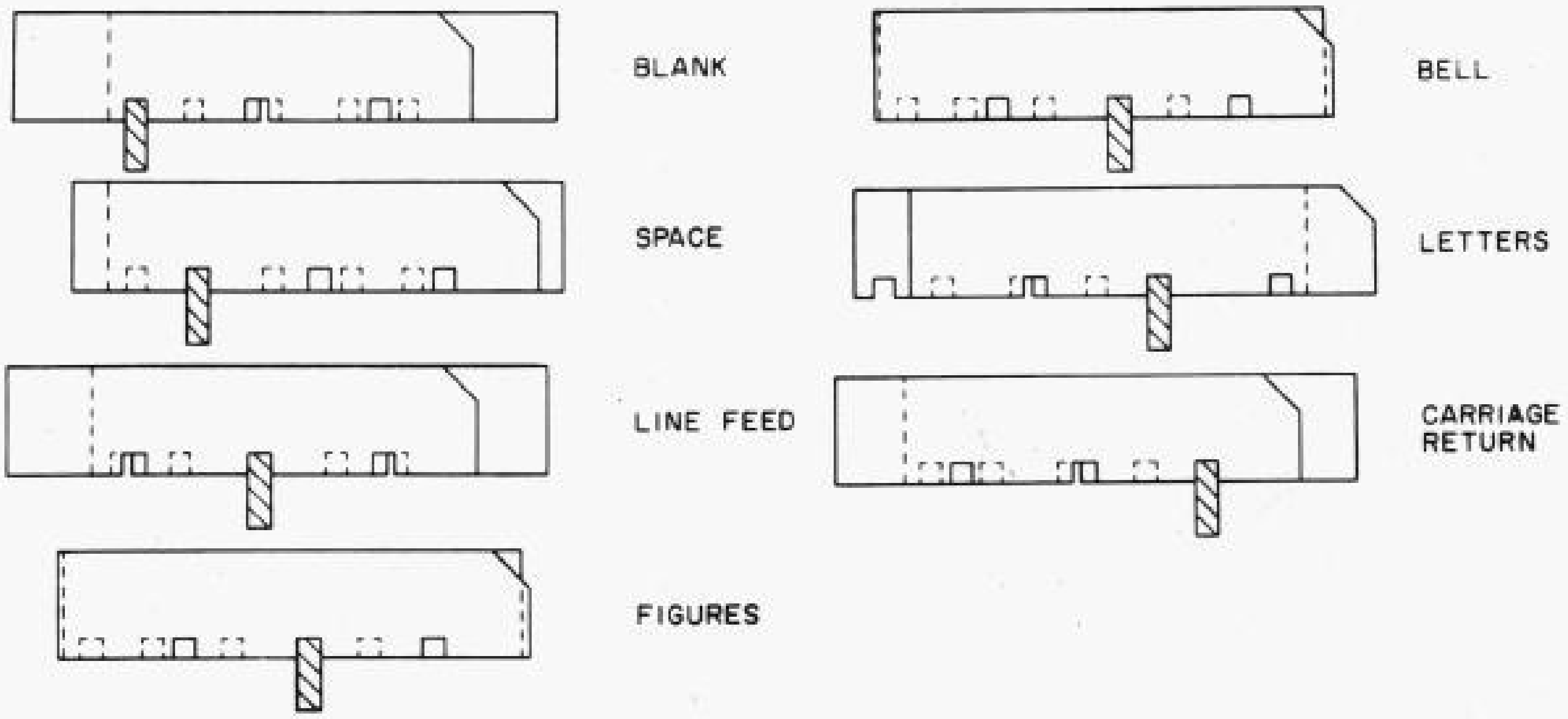


Figure 4-17. Rotary and Lateral Slides, Function Positions

TABLE 4-1. FUNCTION AND PULSE DATA

FUNCTION	MARKING PULSES 1	2	3	4	5	RESULTS
Blank						Suppresses printing and character advance. AN/UGC-38 prints and advances in figures Blank
Space			X			Suppresses printing only.
Line Feed		X				Suppresses printing and character advance. Engage line feed clutch to function mainshaft.
Figures	X	X		X	X	Suppresses printing and character advance. Engages letters-figures clutch to function mainshaft and rotates to figures position if it was previously held in letters position.
Bell	X		X			Suppresses printing and character advance. Moves bell clapper. Operates only when in figures shift.
Letters	X	X	X	X	X	Suppresses printing and character advance. Engages letters-figures clutch to function mainshaft and rotates to letters position if it was previously held in figures position.
Carriage Return				X		Suppresses printing and character advance. Engages carriage return clutch to function mainshaft.

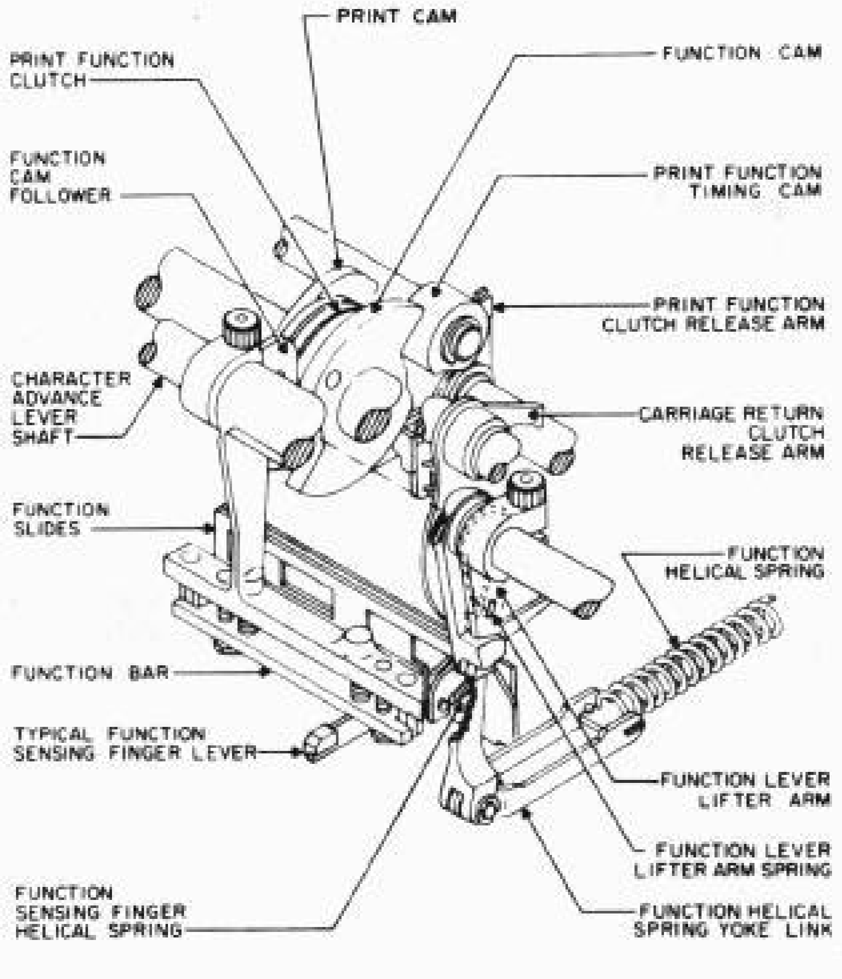
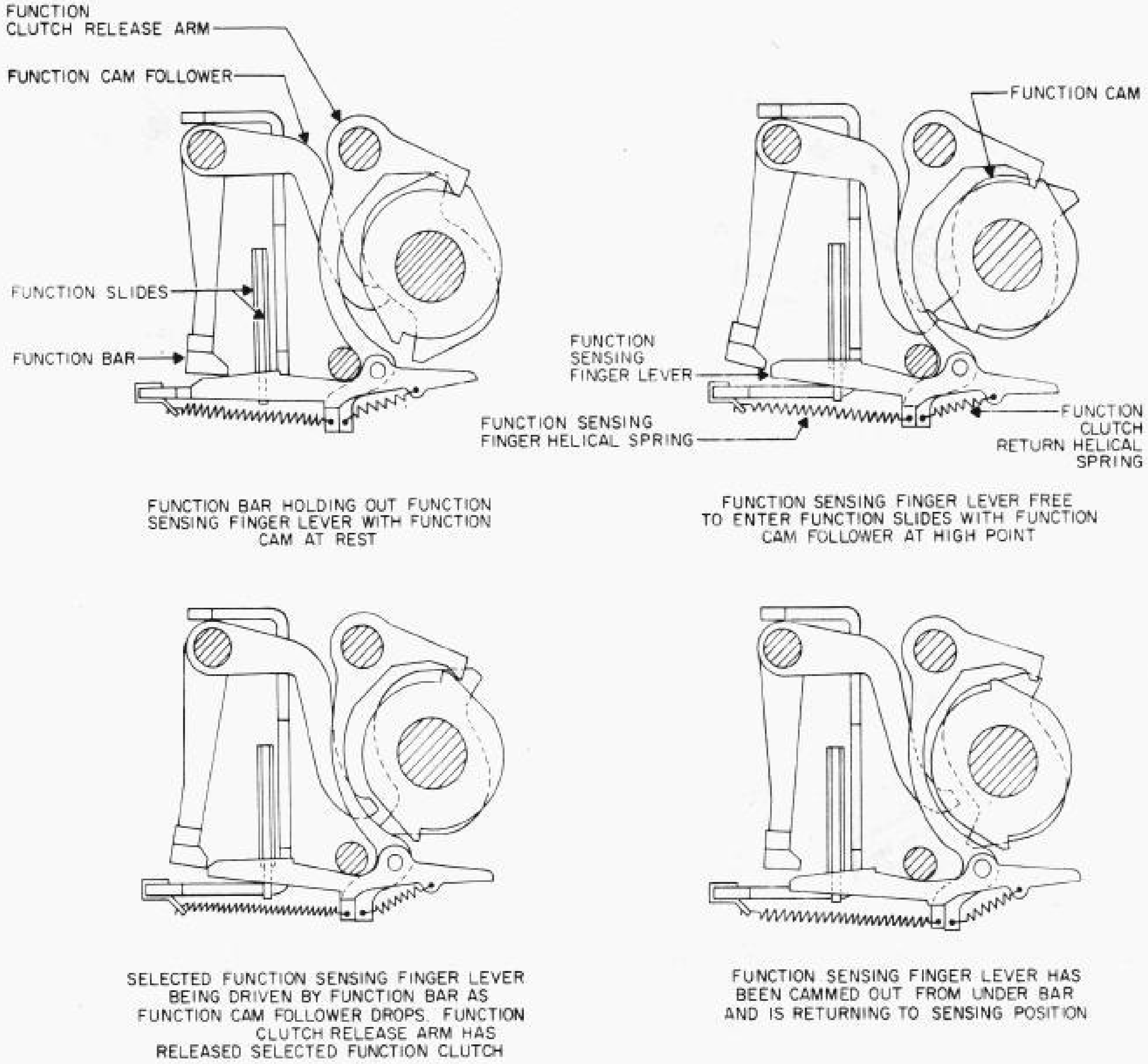

PRINT CAM
PRINT FUNCTION CLUTCH
FUNCTION CAM FOLLOWER
CHARACTER ADVANCE LEVER SHAFT
FUNCTION SLIDES
FUNCTION BAR
TYPICAL FUNCTION SENSING FINGER LEVER
FUNCTION SENSING FINGER HELICAL SPRING
FUNCTION CAM
PRINT FUNCTION TIMING CAM
PRINT FUNCTION CLUTCH RELEASE ARM
CARRIAGE RETURN CLUTCH RELEASE ARM
FUNCTION HELICAL SPRING
FUNCTION LEVER LIFTER ARM
FUNCTION LEVER LIFTER ARM SPRING
FUNCTION HELICAL SPRING YOKE LINK

Figure 4-18. Function Selector,
Start of Function Cycle

sensing finger has been permitted to fall into a pair of slots, the function cam follower drops off the high side of the function cam to the low side and allows the function spring to pull the function bar downward, clearing the function sensing fingers. The relationship of the function bar to the function sensing fingers is such that the bar will hit the top of any sensing finger already in a pair of slots but will deflect outward toward the bottom of the printer any sensing fingers which have not fallen into the slots. Only the one function which has been commanded by the incoming pulse train can be selected.

(b) COMPLETION OF FUNCTION CYCLE. (See Figure 4-19) - Any finger which has been selected to perform a function will be driven toward the rear of the printer by the function bar. This motion of the finger moves the U bar (function clutch release finger), to which it is pivoted, and introduces its individual function. The motion of the function bar continues beyond the point at which the function is performed. This additional function bar motion pushes the inner surface of the sensing finger against a rod, camming the sensing finger outward until it slips out from under the bar and is returned by its spring to the original sensing position, providing clearance between sensing edge of sensing fingers and the edge of function slides. The function bar, after reaching its low point, is raised again about one-third by the function cam follower, at which time the function-print clutch reaches its stop point and the cycle is


FUNCTION CLUTCH RELEASE ARM
FUNCTION CAM FOLLOWER
FUNCTION CAM
FUNCTION SLIDES
FUNCTION BAR
FUNCTION SENSING FINGER LEVER
FUNCTION SENSING FINGER HELICAL SPRING
FUNCTION CLUTCH RETURN HELICAL SPRING

FUNCTION BAR HOLDING OUT FUNCTION SENSING FINGER LEVER WITH FUNCTION CAM AT REST

FUNCTION SENSING FINGER LEVER FREE TO ENTER FUNCTION SLIDES WITH FUNCTION CAM FOLLOWER AT HIGH POINT

SELECTED FUNCTION SENSING FINGER LEVER BEING DRIVEN BY FUNCTION BAR AS FUNCTION CAM FOLLOWER DROPS. FUNCTION CLUTCH RELEASE ARM HAS RELEASED SELECTED FUNCTION CLUTCH

FUNCTION SENSING FINGER LEVER HAS BEEN CAMMED OUT FROM UNDER BAR AND IS RETURNING TO SENSING POSITION

Figure 4-19. Function Selector, Operating Cycle

completed. When no function is selected, the function bar rises, falls, and deflects all sensing fingers slightly outward, and then rises part way again on the character cycle. However, when a function is selected, one particular finger will fall under the function bar, be pushed to the rear of the printer to engage its clutch or otherwise perform its function, and then be cammed out to return to the sensing position.

(c) BLANK FUNCTION LINKAGE. (See Figure 4-20) - A blank function results in a combination of printing suppression and character advance suppression. The spring action of the blank sensing finger falling into aligned slots in the function slides moves the lower end of the sensing finger outward, moving the spring-loaded print prevent bail with it. The stroke of the sensing finger, caused by the function bar, pivots the U bar to which the finger is attached upward, pushing up the advance prevent bail; therefore, no printing or advancing will take place.

NOTE

The AN/UGC-38 is equipped with a mechanical linkage which allows the printing of a dash (-) in figures blank.

(d) SPACE FUNCTION LINKAGE. (See Figure 4-21) - The space function initiates print suppression, but allows character advance to be performed. The space sensing finger falls into slots of the slides and moves the print prevent bail. Print suppression is performed by moving print prevent bail down, blocking the print cam follower.

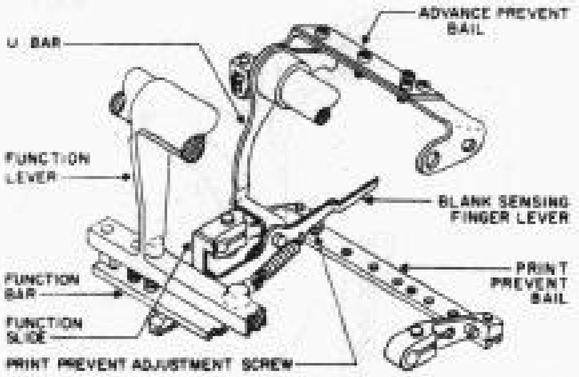


Figure 4-20. Function Selector, Blank Linkage

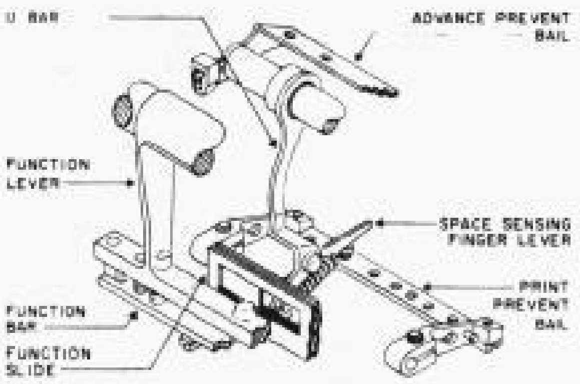


Figure 4-21. Function Selector, Space Linkage

(e) BELL FUNCTION LINKAGE. (See Figure 4-22) - Unlike other non-printing functions, bell can be selected only when the machine has been put in figures position. The bell prevent lever tab is affixed to the letters-figures cam follower so that it prevents the bell sensing finger from falling into the function slides when the machine is in letters position. Operation of the bell sensing finger prevents printing and advance in the same manner as the other functions. The U bar in this case does not release a clutch, but terminates in an arm to which the clapper connecting rod is attached. When the U bar moves, it pulls the clapper connecting rod, causing the clapper to move away from the bell. The bell sensing finger is cammed out, and the U bar returns to its rest position permitting the clapper to move rapidly towards the bell. As a result of its overtravel, the clapper then strikes the bell.

(f) LETTERS-FIGURES FUNCTION LINKAGE. (See Figure 4-23) - Letters and figures operate a common clutch, each capable of releasing the clutch for a 180-degree rotation. Print and advance prevention take place for either letters or figures as described for the blank function (see Paragraph 4-3f(6)(c)) with the U bars serving as clutch releases

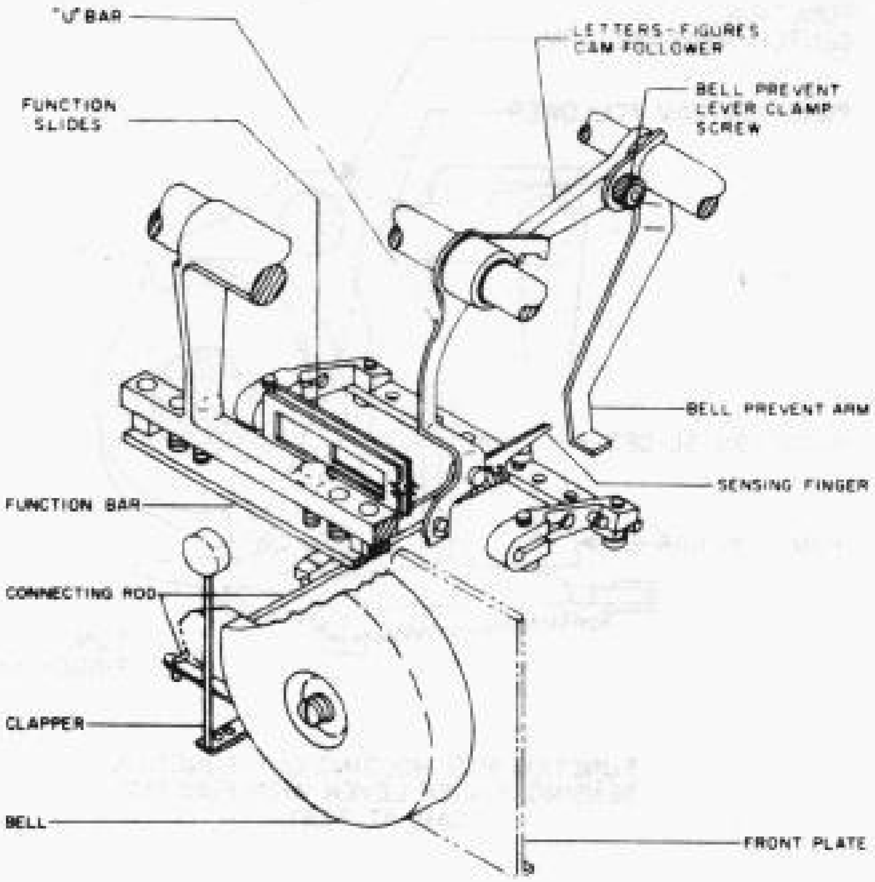
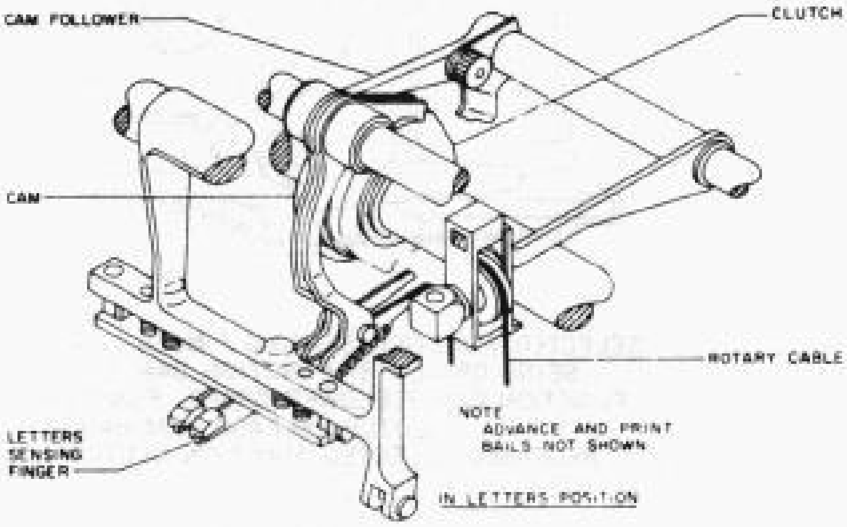
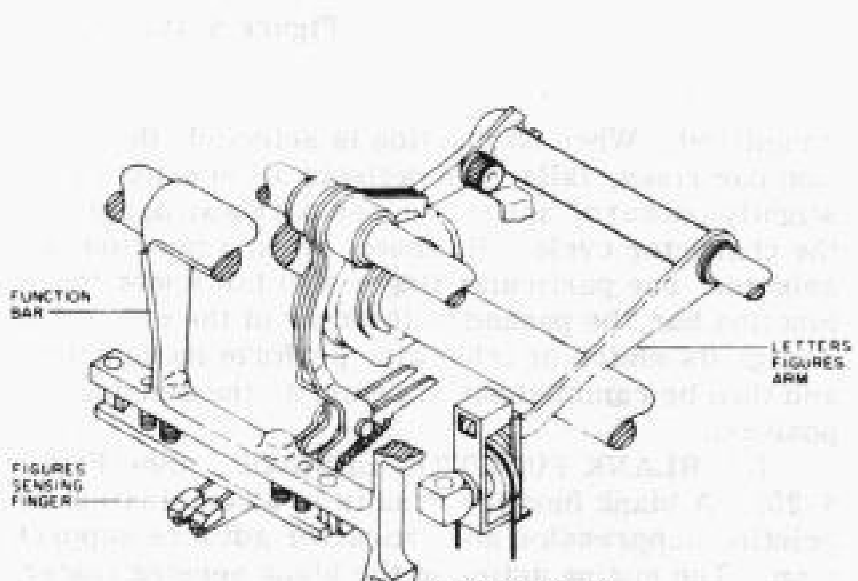


Figure 4-22. Function Selector, Bell Linkage



IN LETTERS POSITION



IN FIGURES POSITION

LETTERS-FIGURES LINKAGE

Figure 4-23. Function Selector, Letters - Figures Linkage

for the common clutch. Therefore, if the clutch is resting in letters position, repeated letters selection will not release it, while a figures selection will permit a 180-degree rotation. The letters-figures cam follower transmits its motions through a torque tube to its arm and pulley carriage. The motion of the cam follower positions the letters-figures pulley in one of two positions, thereby effectively shortening or lengthening the rotary cable the equivalent of 180 degrees on the type cylinder. In practice, the letters position has the cam follower on the high side and the cable is effectively shortened.

(g) LINE FEED FUNCTION LINKAGE. (See Figure 4-24) - Line feed consists of print and advance suppression as well as a positive mechanical action. In this case, print and advance suppression are as described for the blank function (see Paragraph 4-3f(6)(c)). In addition, the U bar used for advance suppression becomes a clutch release finger which allows a 180-degree rotation of the line feed clutch and the cam affixed to it. The line feed cam follower transfers its motion through a torque shaft to the line feed pawl which moves the line feed detent ratchet.

The change from double to single line feed is accomplished by positioning the line feed shift arm. Setting the line feed shift arm for single space moves the arm closer to the pawl teeth and holds the line feed pawl away from the ratchet so that only the second tooth engages.

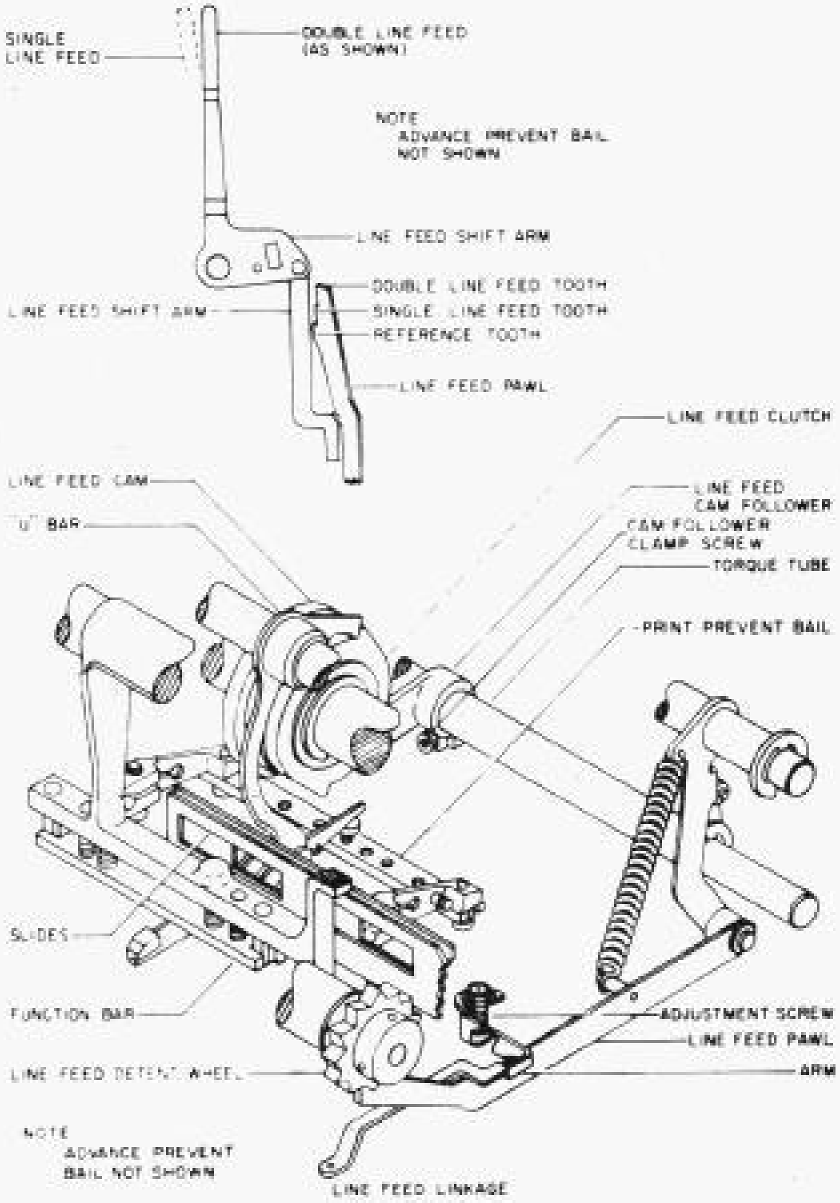


Figure 4-24. Function Selector, Line Feed Linkage

(h) PRINTING ACTION. (See Figure 4-25) - The print cam is affixed to the same clutch as the function cam. This clutch is released once every character cycle, regardless of the combination of pulses received. The release of the clutch turns the print cam and moves the cam follower, which is spring-loaded against the cam by the print spring arm. The spring arm is attached to the print shaft.

When printing is to be performed, the print cam follower will fall off the high portion of the cam (shortly after the function cam follower falls), rotating the print shaft and moving the terminal lever. This motion is transmitted to the hammer shaft assembly and thence to the hammer. Toward the end of its motion, the hammer disconnect link is moved with the terminal lever, forcing the hammer shaft link away from the terminal lever just before hammer impact. The inertia of the hammer, however, is sufficient to complete the printing stroke although the driving force has been released.

(i) PRINT PREVENTION. (See Figure 4-26) - When a non-printing function is selected, the sensing finger pushes out the spring-loaded print prevent bail. The pivoting action of the bail moves the print prevent bail lever under the print prevent arm, which just clears it when the print cam follower is on the high portion of the cam. There is a small step in the print cam, from which the print cam follower drops just prior to the fall of the function cam. This slight step serves to lock the print prevent bail lever under the print prevent arm. The function bar action precedes the final drop in the print cam in order to store the print or no-print action until the print cam follower drops.

The positioning of the print prevent bail lever beneath the print prevent arm blocks the final drop of the print cam follower, thereby preventing printing. The rising of the print cam follower on the next character cycle frees the print prevent bail lever. The bail will then be spring-returned to its sensing position. If desired, printing cam be permitted on functions by disabling the print prevention linkage; the various function symbols shown in Figure 1-2 will then be printed.

(j) CHARACTER ADVANCE PREVENTION. (See Figure 4-27) - Advance prevention takes place for all functions except space (and figures blank, AN/UGC-38 only). The U bars move the advance prevention bail, which is affixed to the carriage return cam follower, slightly upwards. This motion is equivalent to about one-half the upward motion that is induced by the carriage return cam. This motion is transmitted through the carriage return shaft to the carriage return lever, whose motion is sufficient to withdraw the advance feed pawl and engage it on the advance prevention catch but is not sufficient to release the advance check pawl. Consequently, advancing is prevented without permitting carriage return. If desired, character advance on functions may be allowed by removing adjustment screws.

(k) CARRIAGE RETURN FUNCTION LINKAGE. (See Figure 4-28) - Carriage return combines print prevention and simultaneous action by the U bar to engage the carriage return clutch and cam. The rising motion of the carriage return cam moves its follower away until the carriage return lock lever intersects the notch in the carriage return cam

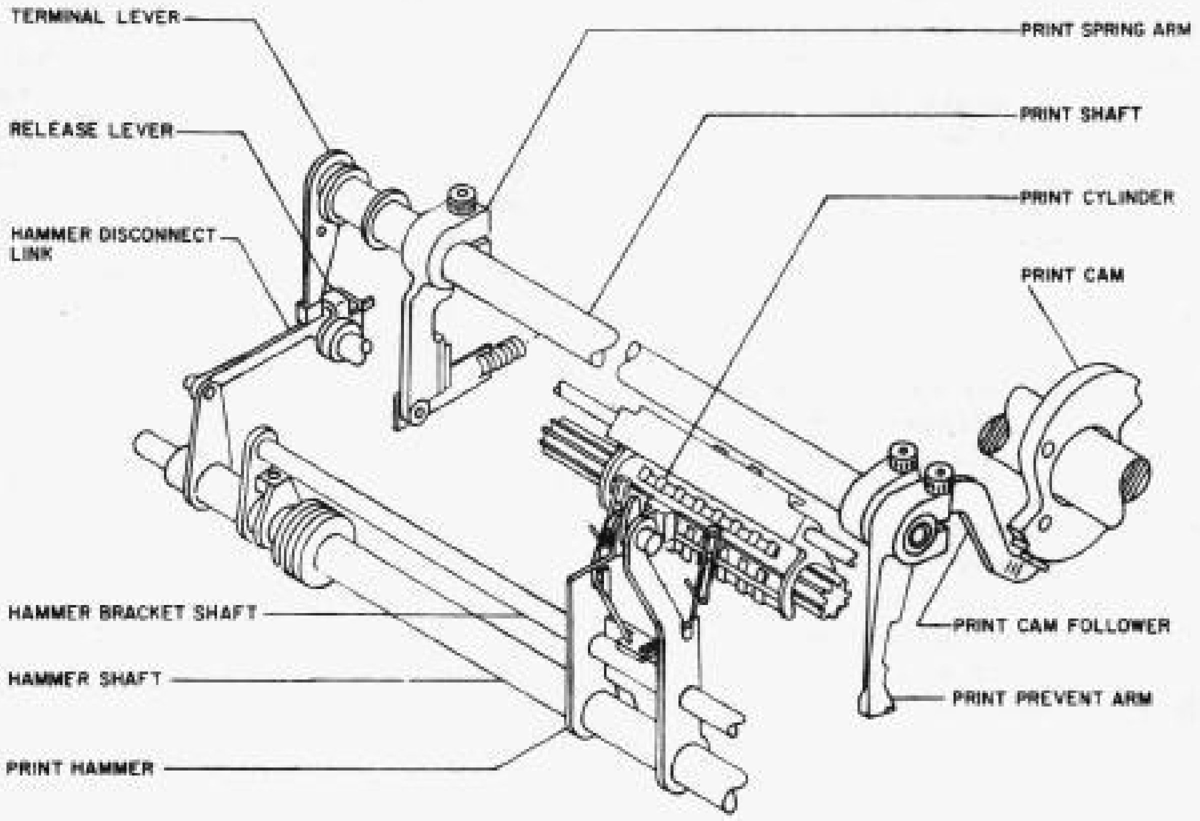


Figure 4-25. Function Selector, Character Printing Linkage

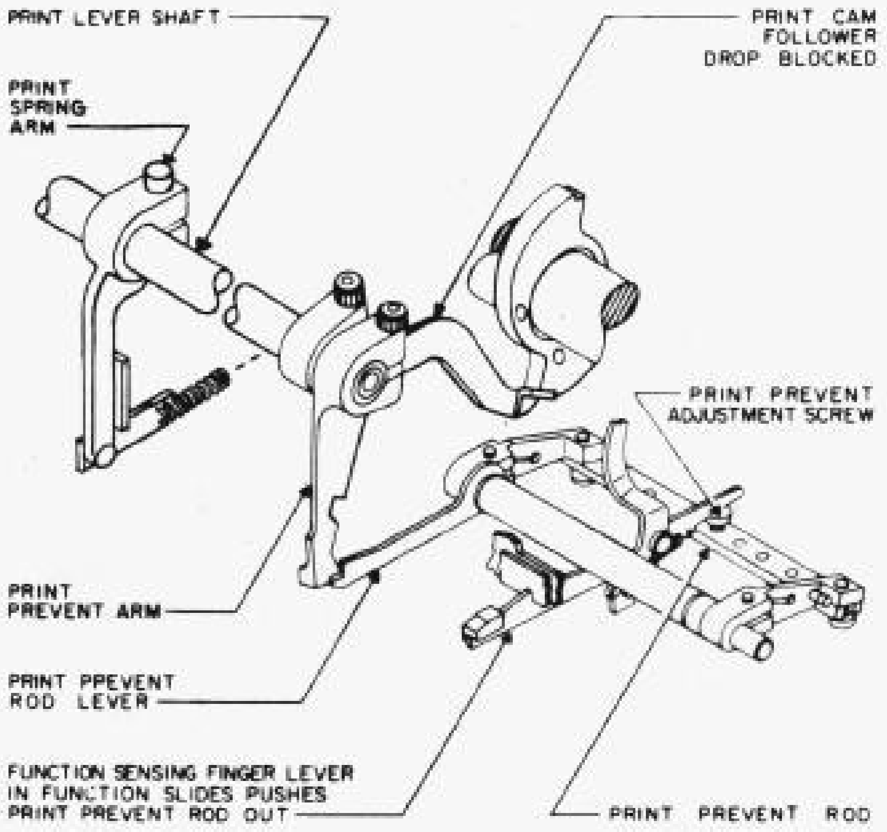

PRINT LEVER SHAFT
PRINT CAM FOLLOWER DROP BLOCKED
PRINT SPRING ARM
PRINT PREVENT ADJUSTMENT SCREW
PRINT PREVENT ARM
PRINT PPEVENT ROD LEVER
FUNCTION SENSING FINGER LEVER IN FUNCTION SLIDES PUSHES PRINT PREVENT ROD OUT
PRINT PREVENT ROD

Figure 4-26. Function Selector, Print Prevention Linkage

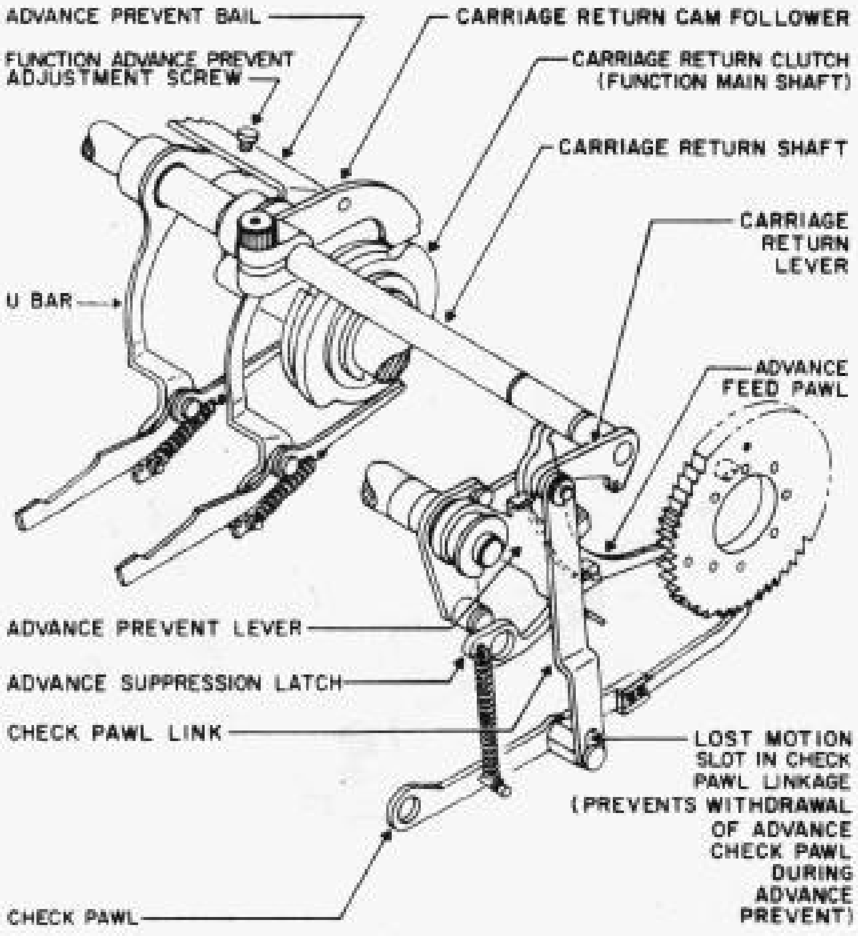

ADVANCE PREVENT BAIL
FUNCTION ADVANCE PREVENT ADJUSTMENT SCREW
CARRIAGE RETURN CAM FOLLOWER
CARRIAGE RETURN CLUTCH (FUNCTION MAIN SHAFT)
CARRIAGE RETURN SHAFT
CARRIAGE RETURN LEVER
U BAR
ADVANCE FEED PAWL
ADVANCE PREVENT LEVER
ADVANCE SUPPRESSION LATCH
CHECK PAWL LINK
LOST MOTION SLOT IN CHECK PAWL LINKAGE (PREVENTS WITHDRAWAL OF ADVANCE CHECK PAWL DURING ADVANCE PREVENT)
CHECK PAWL

Figure 4-27. Function Selector, Character Advance Prevent Linkage

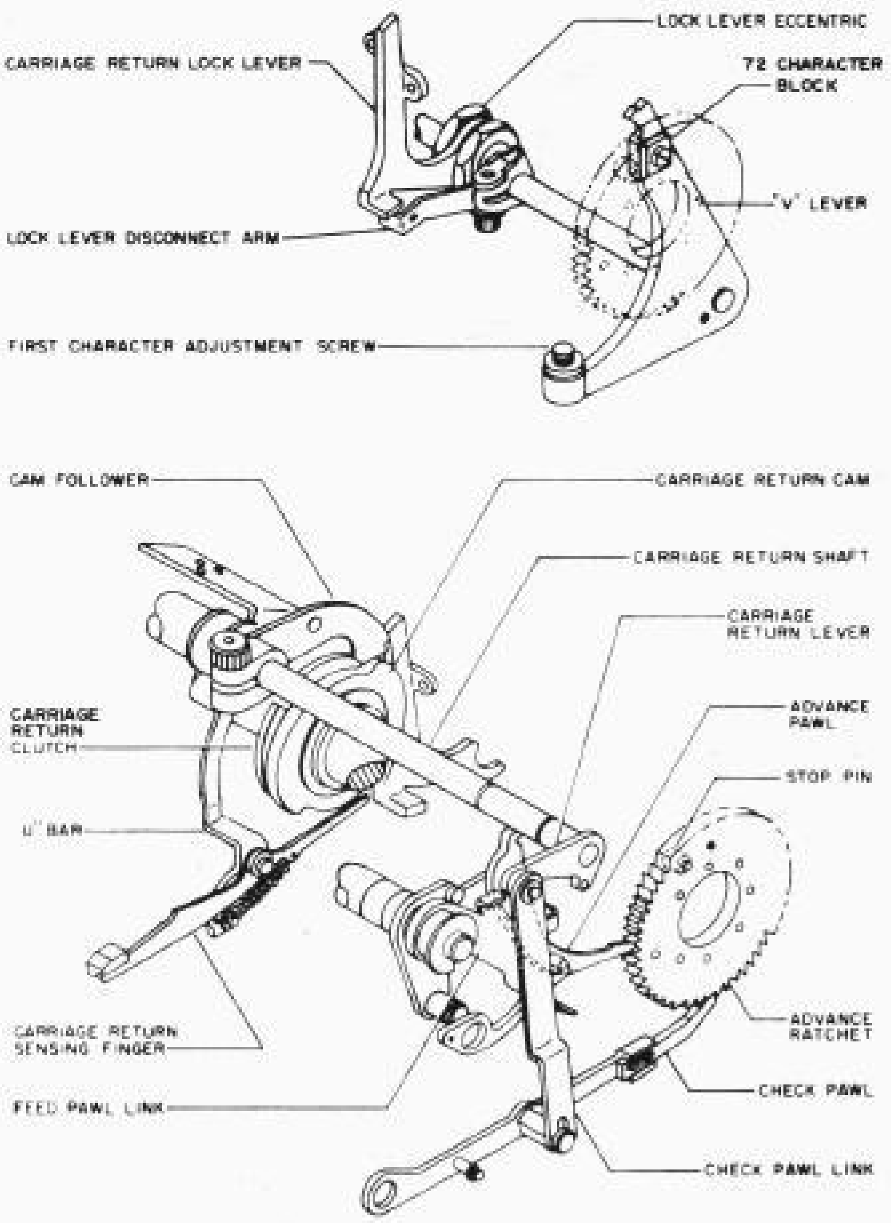


Figure 4-28. Function Selector,
Carriage Return Linkage

follower. Movement of the cam follower rotates the carriage return shaft and lever, resulting in a downward motion of the check pawl link and advance prevention lever. This motion disengages the advance check pawl and advance feed pawl from the advance ratchet until carriage return is completed. As the carriage return cycle is completed, the stop pin on the inner face of the advance ratchet strikes the V lever, which in turn rotates the lock lever disconnect arm, disengaging the lock lever from the notch in the carriage return cam follower.

(l) AUTOMATIC CARRIAGE RETURN AND LINE FEED. (See Figure 4-29) - Automatic carriage return and line feed are provided at the end of any line if carriage return has not been signalled to the machine. Function fingers similar to the other function sensing fingers are provided for these two functions. However, these fingers do not actually sense the slide alignment but are spring loaded such that they tend to fall beneath the function bar regardless of the position of the slides. This action is prevented, however, by the automatic carriage return and line feed actuator assembly which is affixed to the V lever shaft. The actuator assembly and shaft are spring loaded against the automatic carriage return and line feed fingers in such a manner that the bias springs urging the fingers beneath the function bar are overcome. When the advance drum reaches the end of the line with no carriage return signal, the stop pin mounted on the drum pushes against the V lever, overcoming the shaft spring and turning the shaft, thus relieving the pressure on the two function fingers. These fingers fall beneath the function bar on its next stroke, releasing the carriage return and line feed clutches.

(m) OFF-LINE FUNCTION INTRODUCTION. (See Figure 4-30) - Off-line function controls are provided on the printer cover to introduce, through appropriate linkage, off-line functions of line feed, figures, letters, and carriage return into the printer. These functions, while operating only on the local printer, do not electrically affect the signal line or the magnetic selector, and thus can be introduced while receiving copy. With the exception of letters, the off-line function controls operate levers which push the U bars in and release the appropriate clutches. Since the sensing fingers do not fall into slides in off-line function selection, there is no print prevention motion; however, the motion of the U bar does prevent character advance.

In the case of letters, there is a theoretical possibility that the release of the letters clutch at the wrong time may jam the machine. Therefore the manual introduction of letters is accomplished differently. The letters off-line function control moves a slide inward, camming a leaf spring against a finger similar to a function sensing finger. This finger is urged against the function bar, beneath which it falls when the bar is at its high point. The finger falls under the function bar without interfering with the slide and is driven downward by the bar, pivoting the U bar and releasing the letters clutch. In this manner, the off-line introduction of letters is timed to the normal stroke of the function bar.

(n) AUTOMATIC LINE FEED ON CARRIAGE RETURN. (See Figure 4-31) - When enabled, the automatic line feed on carriage return mechanism negates the possibility of overprinting one or more lines of material, even if the generator fails to send the line feed signal at the end of the line. Upon receipt of the carriage return signal, the function bar strikes the carriage return sensing finger lever driving it to the rear, the extension of carriage return clutch release arm (2, Figure 4-31) engages latch assembly (11). Latch assembly (11) activates carriage return lever (9) and line feed lever assembly (12). Line feed lever assembly (12) strikes the extension of the line feed clutch release arm (1), releasing the line feed clutch.

When the carriage return sensing finger is deflected from under the function bar, its bias spring restores it to the standby condition. Spring (6) attached to the carriage return lever and cancellation lever assembly (7), returns the automatic line feed linkage to a standby condition.

The off-line functions, line feed, and carriage return, may still be independently selected by depressing their respective off-line function controls on the front cover. When the off-line carriage return control is activated, an adjustable slide (3) engages an extension of the cancellation lever (7). The cancellation lever rotates in a counterclockwise direction and a tab on the lever engages and withdraws the latch from under carriage return clutch release arm (2). This allows activation of carriage return without line feed. Line feed may be selected by depressing the

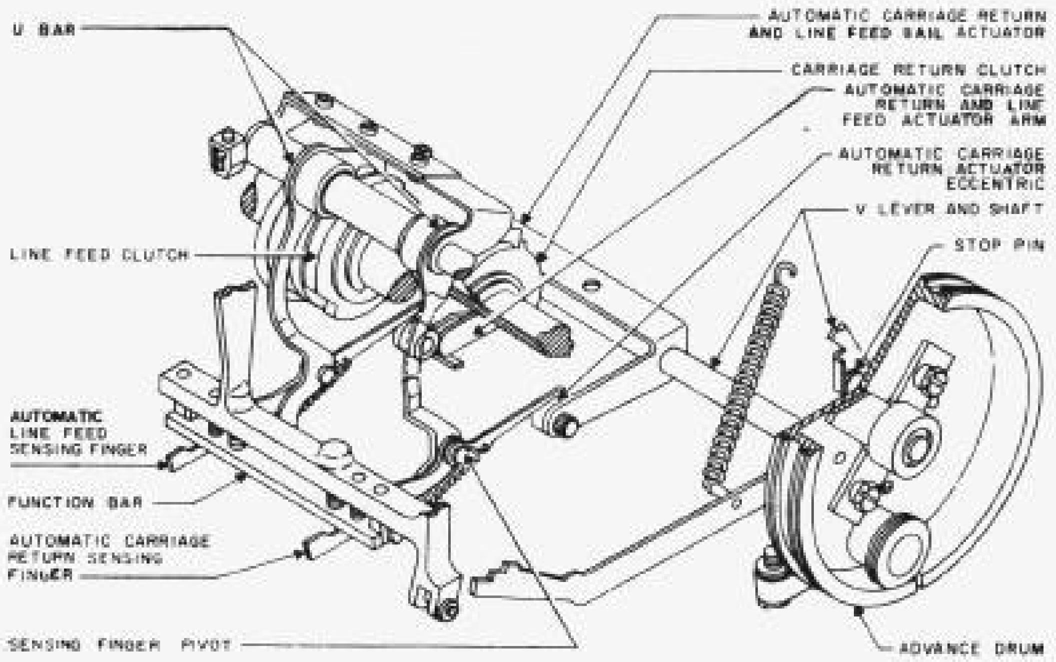
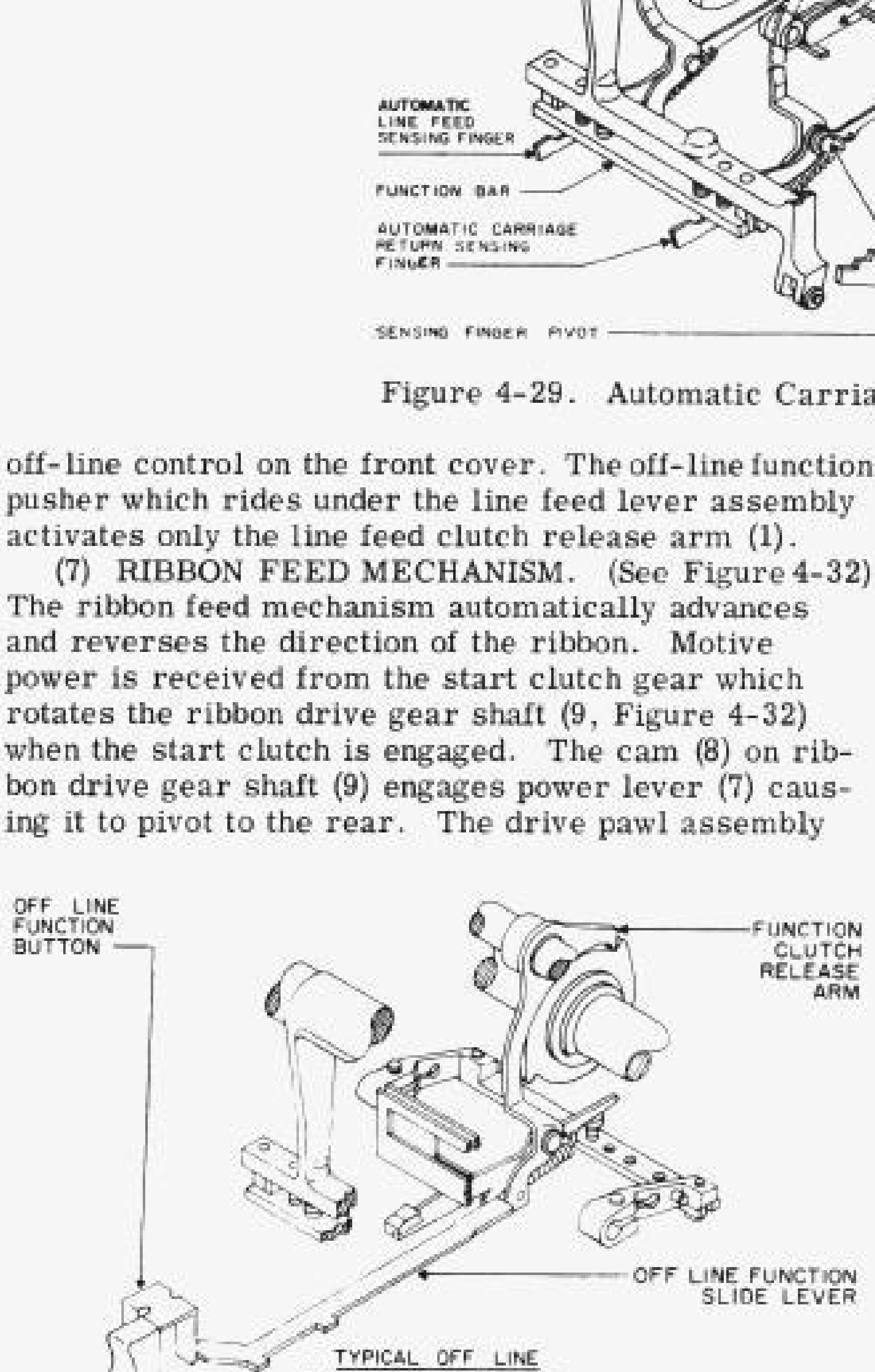

U BAR
LINE FEED CLUTCH
AUTOMATIC LINE FEED SENSING FINGER
FUNCTION BAR
AUTOMATIC CARRIAGE RETURN SENSING FINGER
SENSING FINGER PIVOT
AUTOMATIC CARRIAGE RETURN AND LINE FEED BAIL ACTUATOR
CARRIAGE RETURN CLUTCH
AUTOMATIC CARRIAGE RETURN AND LINE FEED ACTUATOR ARM
AUTOMATIC CARRIAGE RETURN ACTUATOR ECCENTRIC
V LEVER AND SHAFT
STOP PIN
ADVANCE DRUM

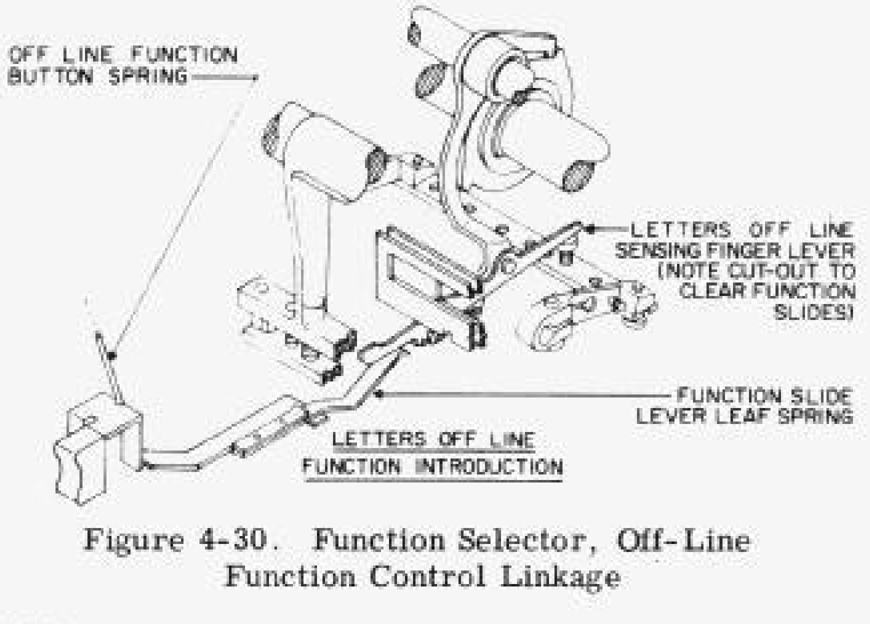
Figure 4-29. Automatic Carriage Return and Line Feed Linkage

off-line control on the front cover. The off-line function pusher which rides under the line feed lever assembly activates only the line feed clutch release arm (1).

(7) RIBBON FEED MECHANISM. (See Figure 4-32) The ribbon feed mechanism automatically advances and reverses the direction of the ribbon. Motive power is received from the start clutch gear which rotates the ribbon drive gear shaft (9, Figure 4-32) when the start clutch is engaged. The cam (8) on ribbon drive gear shaft (9) engages power lever (7) causing it to pivot to the rear. The drive pawl assembly (4) is pushed to the rear by the motion of power lever (7). The check pawl tab (3) and drive pawl tab (4) assemblies are spring loaded causing them to return to the rest position. On the backstroke of power lever (7) drive pawl tab (4) engages a tooth on ribbon spool spindle (5) causing it to rotate. While ribbon spool spindle (5) is being rotated, check pawl tab (3) falls into a tooth on ribbon spool spindle (5). Automatic ribbon reversal is accomplished when ribbon eyelet pulls reversal bar (6) causing one of the drive pawl reversing tabs (11) to be blocked by tabs (12) on reversal bar (6). This causes check pawl tab (3) and drive pawl tab (4) to be pivoted in the opposite direction during the next cycle of operation.



TYPICAL OFF LINE FUNCTION INTRODUCTION


OFF LINE FUNCTION BUTTON SPRING
LETTERS OFF LINE SENSING FINGER LEVER (NOTE CUT-OUT TO CLEAR FUNCTION SLIDES)
FUNCTION SLIDE LEVER LEAF SPRING

LETTERS OFF LINE FUNCTION INTRODUCTION

Figure 4-30. Function Selector, Off-Line Function Control Linkage

(8) PRINTER MOTOR. - The motor supplied with the teletypewriter set requires 115-vac, 60 cps, single phase primary power. The motor is the hysteresis-synchronous type, and requires a 5.0 UF capacitor in series with a stator winding to provide phase shift for directional starting and running.

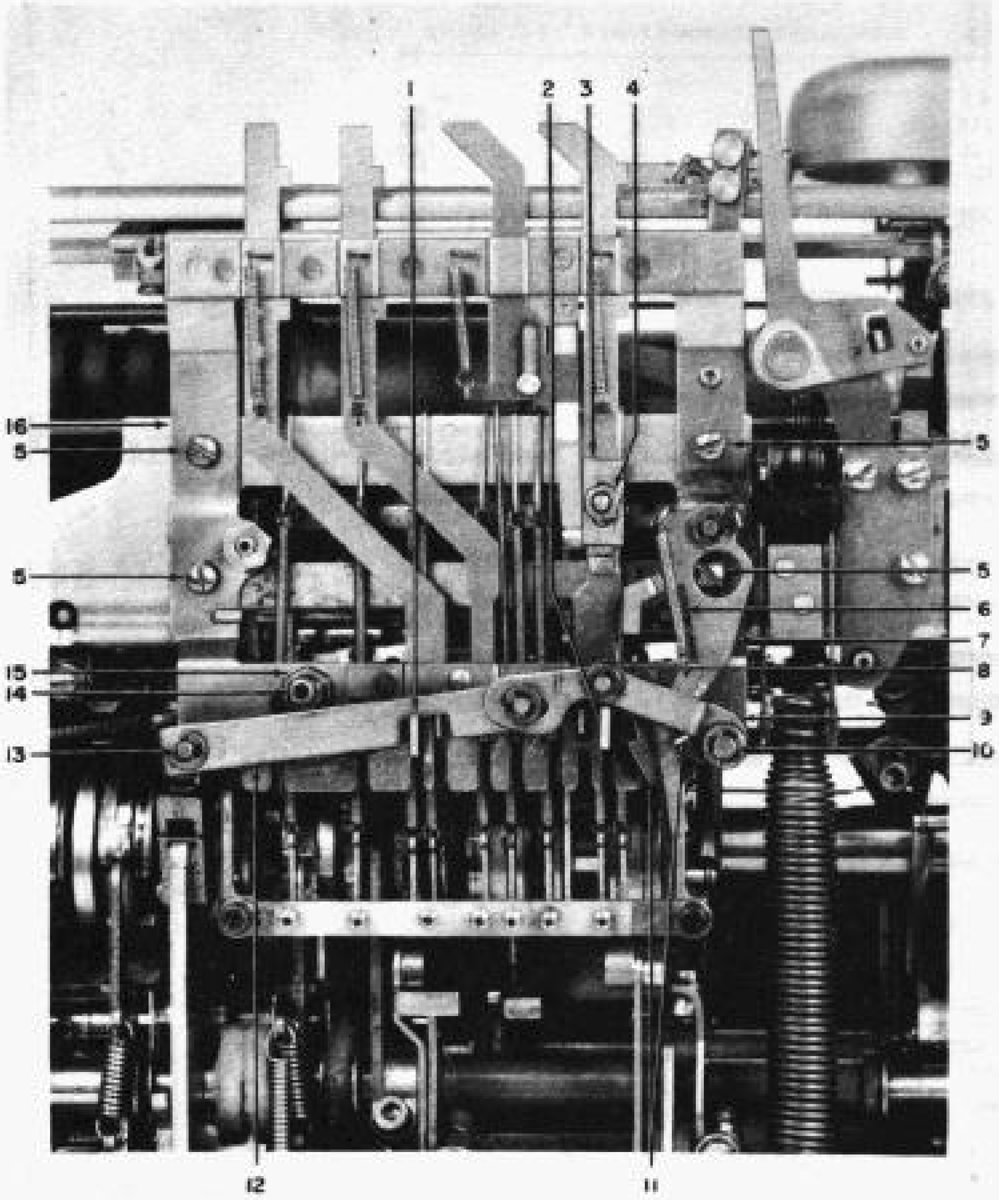
Motor pinion gear speed should be 3600 rpm. Frequency can vary ±5% (57 to 63 cycles per second); however, distortion is greatly increased with any change in frequency.

4-4. SIGNAL DISTORTION.

Teletypewriter signals, as well as all d-c signals, are subject to distortion. This distortion may be caused by the line facilities, natural or man-made electrical disturbances, cross-fire, or sporadic changes of operating speed at either the local or remote station. Distortion of a start-stop teletypewriter signal is the shifting of the transition points of the signal pulses from their proper positions relative to the beginning of the start pulse. Figure 4-33 illustrates the various types of distortion in relation to a perfect signal and mechanical functions of the printer.

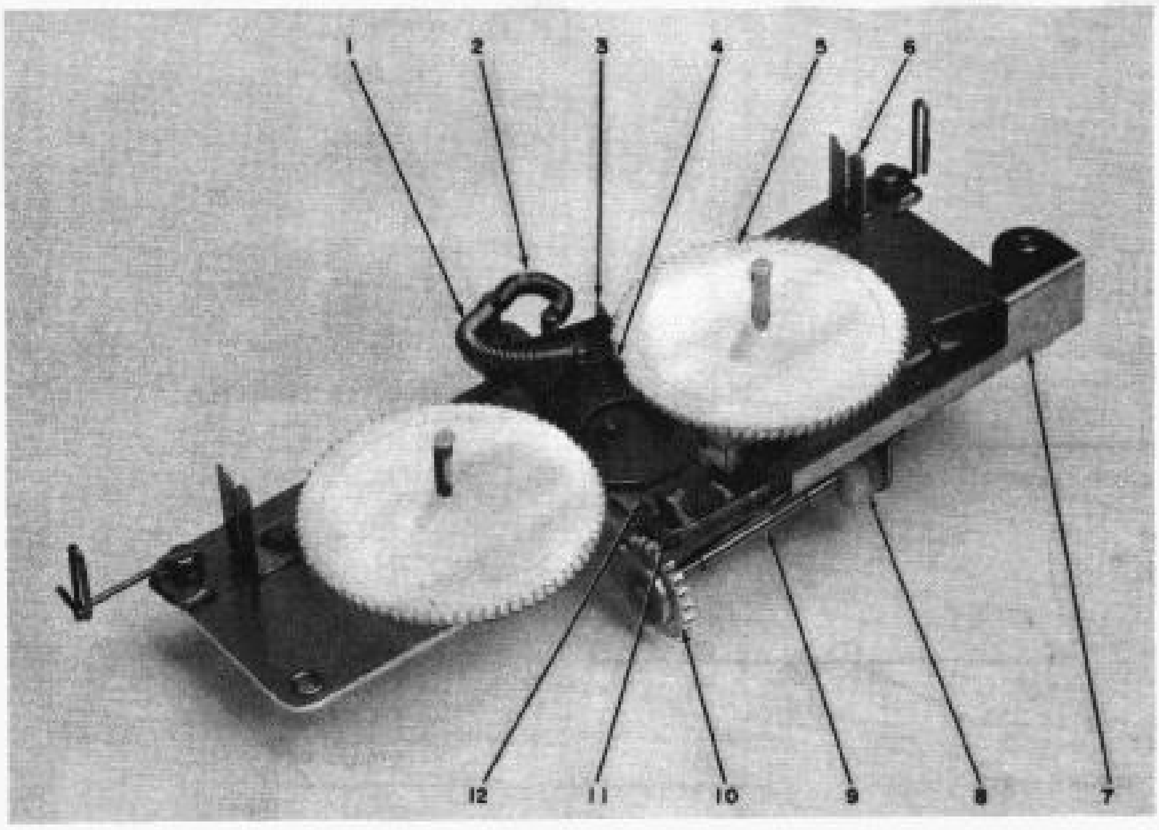
a. BIAS DISTORTION. - Bias distortion or bias of start-stop teletypewriter signals is the uniform shifting of the beginning of all marking pulses from their proper positions in relation to the beginning of the start pulse.

b. END DISTORTION. - End distortion of the start-stop teletypewriter signals is the shifting of the



KEY	ITEM
1	Line Feed Clutch Release Arm (Extension)
2	Carriage Return Clutch Release Arm (Extension)
3	Adjustable Slide
4	Hex-nut
5	Slotted Head Screws
6	Cancellation Spring (in Disable Position)
7	Cancellation Lever
8	Latch Spring
9	Carriage Return Lever
10	Carriage Return Lever Post (Mounted on Slide Assembly)
11	Latch
12	Line Feed Lever
13	Line Feed Lever Post (Mounted on Slide Assembly)
14	Socket Head Cap Screw
15	Eccentric
16	Manual Function Slide Assembly

Figure 4-31. Automatic Line Feed on Carriage Return Mechanism

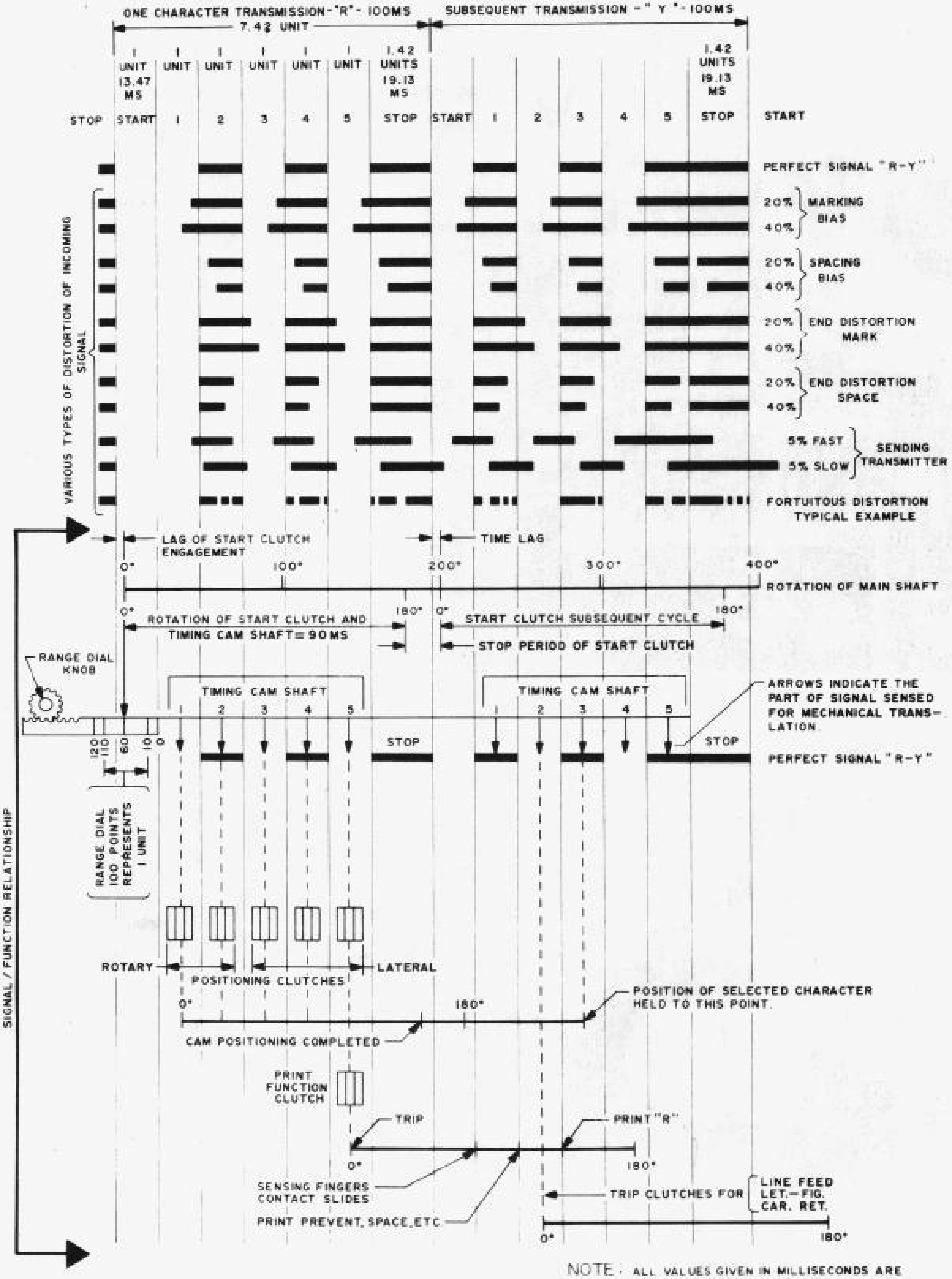


KEY	ITEM
1	Drive Pawl
2	Check Pawl Spring
3	Check Pawl Tab
4	Drive Pawl Tab
5	Ribbon Spool Spindle
6	Reversal Bar
7	Power Lever
8	Cam
9	Ribbon Drive Gear Shaft
10	Ribbon Drive Gear
11	Drive Pawl Reversing Tabs
12	Reversal Bar Tab

Figure 4-32. Ribbon Feed Mechanism

end of all marking pulses from their proper positions in relation to the beginning of the start pulse.

c. FORTUITOUS DISTORTION. - Fortuitous distortion of telegraph signals is the random departure from the average of the position of the transition points of a signal pulse. This type of distortion can be caused by cold solder joints, contact bounce, dirty contact brushes, intermittent opens in the signal line and other related causes.


ONE CHARACTER TRANSMISSION-"R"- 100MS
7.42 UNIT
SUBSEQUENT TRANSMISSION - " Y " - 100MS
1 UNIT 13.47 MS
1 UNIT
1 UNIT
1 UNIT
1 UNIT
1 UNIT
1.42 UNITS 19.13 MS
1.42 UNITS 19.13 MS
STOP
START
1
2
3
4
5
STOP
START
1
2
3
4
5
STOP
START
PERFECT SIGNAL "R-Y"
20%
40%
MARKING BIAS
20%
40%
SPACING BIAS
20%
40%
END DISTORTION MARK
20%
40%
END DISTORTION SPACE
5% FAST
5% SLOW
SENDING TRANSMITTER
FORTUITOUS DISTORTION TYPICAL EXAMPLE
VARIOUS TYPES OF DISTORTION OF INCOMING SIGNAL
LAG OF START CLUTCH ENGAGEMENT
TIME LAG
0°
100°
200°
300°
400°
ROTATION OF MAIN SHAFT
0°
ROTATION OF START CLUTCH AND TIMING CAM SHAFT = 90 MS
180°
0°
START CLUTCH SUBSEQUENT CYCLE
180°
STOP PERIOD OF START CLUTCH
RANGE DIAL KNOB
TIMING CAM SHAFT
1
2
3
4
5
TIMING CAM SHAFT
1
2
3
4
5
ARROWS INDICATE THE PART OF SIGNAL SENSED FOR MECHANICAL TRANSLATION
120
110
60
10
0
STOP
STOP
PERFECT SIGNAL "R-Y"
RANGE DIAL 100 POINTS REPRESENTS 1 UNIT
SIGNAL / FUNCTION RELATIONSHIP
ROTARY
POSITIONING CLUTCHES
LATERAL
0°
180°
POSITION OF SELECTED CHARACTER HELD TO THIS POINT.
CAM POSITIONING COMPLETED
PRINT FUNCTION CLUTCH
TRIP
PRINT "R"
0°
180°
SENSING FINGERS CONTACT SLIDES
PRINT PREVENT, SPACE, ETC
TRIP CLUTCHES FOR
LINE FEED
LET.-FIG.
CAR. RET.
0°
180°

NOTE: ALL VALUES GIVEN IN MILLISECONDS ARE BASED ON 100 W.P.M. SPEED.

Figure 4-33. Signal Distortion and Timing Chart

SECTION 5

MAINTENANCE

5-1. INTRODUCTION

This section, divided into three subsections, contains preventive maintenance, trouble-shooting, and repair information for Teleprinter Sets AN/UGC-38 and AN/UGC-40, and Teletypewriter Set AN/UGC-41.

The Preventive Maintenance subsection contains tabular test procedures to be performed by operating and maintenance personnel at specified intervals to detect indications of abnormal performance. The maintenance standards portion of this subsection contains maintenance standards which will establish overall performance criteria for the teletypewriter or teleprinter sets.

The preventive maintenance procedures also provide a systematic and efficient method for checking and performing routine preventive maintenance intended to avert impending equipment malfunction.

The trouble-shooting subsection contains overall, functional and electrical component trouble-shooting procedures in tabular form. Trouble-shooting should be confined (in the field) to that work which can be accomplished without complete disassembly, or with partial disassembly of the equipment, and not requiring the use of any tools or test equipment other than those found in the field maintenance shop.

The repair subsection contains information required to test, repair, adjust, and lubricate the equipment.

NOTE

All references to direction in this section are based upon viewing the equipment as seen from the operator's position.

5-2. TEST EQUIPMENT.

Table 5-1 lists the recommended test equipment and tools to service and repair Teletypewriter Set AN/UGC-41 and Teleprinter Sets AN/UGC-40 and AN/UGC-38.

TABLE 5-1. RECOMMENDED TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT AND TOOLS	PREVENTIVE MAINTENANCE	MAINTENANCE STANDARDS	REPAIR
Multimeter AN/PSM-4	X	X	
Electronic Multimeter TS-505/U			X
Oscilloscope AN/USM-24 or AN/USM-105			X
*Teletypewriter Tool Kit TK-188/UG			X
Signal Generator AN/UGM-6(V)	X	X	X
Maintenance Fixture, MITE Part Number 37200	X	X	X
Primary Power Service Cable, MITE Part Number 38557	X	X	X
Signal Service Cable, MITE Part Number 38558	X	X	X
Materials			
Oil, Non-fluid MITE Part No. 34304 1-pint plastic bottle 1N 5815-869-9148	X	X	X
Grease MITE Part No. 05041-0001 8 ounce tube	X	X	X

*This tool kit contains all required special tools and gages.

5-3. PREVENTIVE MAINTENANCE.

GENERAL. - This section is divided into six parts: Operator's Checkoff Lists, Technician's Checkoff Lists, Maintenance Standards, Lubrication, Scheduled Maintenance, and Isolation of Printer Malfunctions. When properly adhered to, these checks and procedures indicate the performance of individual electrical circuits and mechanical systems, and also provide for systematic preventive maintenance of the overall unit.

The preventive maintenance tables establish a calendar inspection system. If, however, 500 hours operation time is accrued prior to the calendar due date, follow the inspection requirements established in Tables 5-4 through 5-7.

A list of operating conditions (which apply to the entire table unless otherwise noted in a given step) is provided at the beginning of action column of each checkoff list. Where illustrations are supplied, the step numbers of the procedures will correspond to the step numbers on accompanying illustrations. Arrows leading from a given step number on an illustration graphically present certain basic information given in the associated step of the procedure table. This basic information includes the point where the test equipment is to be connected to the teletypewriter set and similar information.

Prior to performing the scheduled preventive maintenance procedures, the teletypewriter set should be checked to ensure that the equipment is operating within its design capabilities. The maintenance standards given in Paragraph 5-3c should be performed to ascertain that the equipment is operating normally.

Comparison of test results with the given maintenance standards will reveal any significant change in the operation of the teletypewriter sets. It is expected that the test results will occasionally show nominal variances, which does not necessarily mean that the equipment is operating improperly. If, however, a particular step produces an indication which varies each time the check is made, improper operation or impending failure are indicated and corrective measures should be taken.

a. OPERATOR'S CHECKOFF LISTS. - The following checks (Tables 5-2 and 5-3) are included for use by Operating Personnel. All of the conditions under which these checks are to be accomplished, are included at the beginning of action required column of each table.

TABLE 5-2. OPERATOR'S DAILY CHECK-OFF LIST

STEP NO.	ACTION REQUIRED	PROCEDURE
	Operating conditions and control settings: MOTOR and LAMP switches: ON. SEND.REC/REC switch: SEND-REC. Equipment switched for off-line local mode (refer to Paragraph 2-9). Refer to Section 3 for operating instructions.	
1	Test overall operation of teletypewriter set with keyboard. (AN/UGC-41) [Teleprinters AN/UGC-38 and AN/UGC-40 will require keying devices or Signal Generator AN/UGM-6(V).]	A. Depress LTRS key and type out test message. Observe that machine prints clearly with no garbles. B. Observe that motor stops after 60 seconds of inactivity with time delay MOTOR STOP switch in ENABLE position. C. Depress BREAK button (observe that motor starts). D. Type out a complete row of characters and observe that automatic carriage return and line feed take place after 72 or 76 characters have been printed. E. Test all off line function buttons on the printer front cover for proper operation. F. Move rotary mode switch to local mode, place SEND.REC/REC to SEND.REC position and type a test message. Check printed message. Switch to REC position to ensure that printer does not receive from keyboard.

TABLE 5-3. OPERATOR'S WEEKLY CHECK-OFF LIST

STEP NO.	ACTION REQUIRED	PROCEDURE
	Operating conditions and control settings: Primary power removed. Teletypewriter Set removed from case.	
1	Inspect components	Inspect cables and lateral control belt for wear. Inspect ribbon for dryness.
2	Clean mechanical parts.	Using a soft lint-free cloth, clean print hammer shaft and print cylinder and yoke shafts.
3	Inspect all mechanical parts for security.	Inspect ribbon feed mechanism and all other mechanical parts for binding or damage.
4	Inspect electrical cables.	Inspect service cable wiring and connectors for secure connections.
5	Inspect electrical chassis rear panel.	Inspect rotary mode switch for proper mode of operation. Inspect fuse caps for security and damage.

b. TECHNICIAN'S CHECK-OFF LISTS. - The technician's check-off lists (Tables 5-4 through 5-7) comprise daily, weekly, 3 week, and 6 week checks. Each of these tables contains a step number, the items to be checked, and a reference to the maintenance standard (satisfactory operating condition). If while performing the various checks a specified maintenance standard cannot be obtained, refer to (Paragraph 5-3f) ISOLATION OF PRINTER MALFUNCTIONS in an effort to isolate the problem area. Refer to LOGICAL TROUBLE SHOOTING, Paragraph 5-4, if unable to diagnose malfunction using isolation of printer malfunction information. If the problem area has been isolated, do not perform the adjustment sequence without first double-checking to ensure that your diagnosis is correct. If it is found that the adjustment is not correct, perform the adjustment sequence as instructed in Paragraph 5-5e.

TABLE 5-4. TECHNICIAN'S DAILY CHECK-OFF

STEP NO.	ACTION REQUIRED	MAINTENANCE STANDARD REFERENCE (Refer to Table 5-8)
	Operating conditions and control settings: Primary power removed. Teletypewriter Set removed from case.	
1	Check paper supply.	
2	Check ribbon for sufficient ink by observing darkness of print.	See CAUTION after Maintenance Standard A10.

TABLE 5-5. TECHNICIAN'S WEEKLY CHECK-OFF

STEP NO.	ACTION REQUIRED	MAINTENANCE STANDARD REFERENCE NUMBER (Refer to Table 5-8)
	Operating conditions and control settings: Teletypewriter set removed from case (Refer to Paragraph 5-5b(3)). Equipment switched for off-line (Refer to Paragraph 2-9).	

TABLE 5-5. TECHNICIAN'S WEEKLY CHECK-OFF (Cont)

STEP NO.	ACTION REQUIRED	MAINTENANCE STANDARD REFERENCE NUMBER (Refer to Table 5-8)
	Primary power removed (Steps 1 and 2) Primary power connected (Steps 3 through 8, and 13)	
1	Clean printer unit.	A9
2	Lubricate unit.	A12
3	Slide alignment and takeup arm adjustment.	A1 - A2
4	Check selection of functions.	A17
5	Check range.	A8
6	Rotary detent pawl pin clearance.	A3
7	Hammer alignment	A4
8	Inspect printer unit.	A10
9	Selector adjustment screws.	A23
10	Function bar adjustment.	A25
11	Advance mechanism.	A26
12	Ribbon feed mechanism.	A27
13	Running adjustment checks.	A28, a, b, c, and d

TABLE 5-6. TECHNICIAN'S 3 WEEK CHECK-OFF

STEP NO.	ACTION REQUIRED	MAINTENANCE STANDARD REFERENCE NUMBER (Refer to Table 5-8)
	Operating conditions and control settings:	
	Teletypewriter set removed from case (Refer to Paragraph 5-5b(3)). Equipment switched for off-line (Refer to Paragraph 2-9). Primary power removed (Steps 2, 4, 5, and 6). Primary power connected (Steps 1, 3, and 5).	
1	Motor Stop Check	
	Time Delay	A7
2	Check stroke	A5 - A6
3	Clean and lubricate unit (Table 5-9)	A9 - A19
4	Inspect and check chassis.	A20
5	Master pulsing contacts.	A18
6	Check function timing cam.	A24

TABLE 5-7. TECHNICIAN'S 6 WEEK CHECK-OFF

STEP NO.	ACTION REQUIRED	MAINTENANCE STANDARD REFERENCE NUMBER (Refer to Table 5-8)
	Operating conditions and control settings: Teletypewriter set removed from case (Refer to Paragraph 5-5b(3)). Equipment switched for off-line (Refer to Paragraph 2-9). Primary power removed (Steps 1, 2, 4, and 5). Primary power connected (Step 3).	
1	Clean selector assembly.	A14
2	Clean motor assembly.	A15
3	Adjustment checks.	A16
4	Shock mounts.	A22

c. MAINTENANCE STANDARDS. - This section is comprised of a group of standards (operating and adjustment) which must be met to ensure optimum performance of the equipment. These standards are to be used as a guide when performing preventive maintenance and trouble isolation procedures. If the standards cannot be met, the related adjustment procedure required to obtain the standard appears next to the standard.

When using the MAINTENANCE STANDARDS (Table 5-8), the left column contains a reference number for referral to this section from other sections, the middle column contains the standard, and the right column contains a reference to the paragraph in which the related adjustment is contained.

TABLE 5-8. MAINTENANCE STANDARDS

REFERENCE NO.	MAINTENANCE STANDARDS	ADJUSTMENT PARAGRAPH NO.
	NOTE The following maintenance standards are keyed to the Technician's Check-off Lists, Tables 5-4 through 5-7, and to the related adjustment procedures. CAUTION DO NOT PERFORM ANY ADJUSTMENT SEQUENCE WITHOUT FIRST CHECKING THE DIAGNOSIS TO ENSURE THAT THE SUSPECT ADJUSTMENT WILL CORRECT THE MALFUNCTION.	
A1	SLIDE ADJUSTMENT	
	Position the printer in letter A with the function clutch in the stop position.	5-5d(6)
	Check for proper alignment of rotary and lateral slide index mark on the function selector frame.	5-5e(3)(b) 5-5e(4)(b)
A2	TAKEUP ARM PULLEY AND TAKEUP DRUM	5-5e(4)(a)
	Check for approximately 1/16-inch clearance between the O.D.'s of the takeup arm pulley and the takeup drum (in letter A).	

TABLE 5-8. MAINTENANCE STANDARDS (Cont)

REFERENCE NO.	MAINTENANCE STANDARDS	ADJUSTMENT PARAGRAPH NO.
A3	ROTARY DETENT PAWL PIN CLEARANCE Check that the detent pin clears the points of the index wheel by at least 0.010-inch when print function clutch is in stopped position.	5-5e(7)
A4	HAMMER ALIGNMENT WITH "I" Position printer in letter "I". Check alignment of hammer with "I" halfway across the line. NOTE Stroke adjustment should have been completed (or checked) if the letter "I" is to be used for hammer alignment.	5-5e(18)(a) and (b)
A5	ROTARY STROKE Check for rotary motion of print cylinder to the type strips containing the letters A, E, L, and T.	5-5e(18)(a)
A6	LATERAL STROKE Check for lateral alignment of printed characters AM, OU, and RY.	5-5e(18)(b)
A7	MOTOR STOP Check motor stop for shut-down within 120 seconds.	Table 5-14
A8	RANGE OF PRINTER: If a signal generator is available: Check for capability of unit to receive 30% marking or spacing bias or 30% marking or spacing end bias. If at existing setting of range dial the unit does not receive and print correctly an RY signal, adjust the range dial until the RY is received and printed correctly. If a signal generator is not available: Check for minimum of 70 point of range at 100 wpm. Hi - Low = points of range. To find the points of range subtract the lowest point on the range dial where the signal can be accepted without errors from the highest point on the range dial where the signal can be accepted without errors. (Minimum points of range at 100 wpm should be 70 points.)	5-5e(2)(b) 5-5e(2)(b)
A9	CLEAN PRINTER UNIT CAUTION ENSURE THAT SPRINGS AND ADJUSTABLE PARTS ARE NOT DISTURBED. Using a soft lint-free cloth, clean the cylinder yoke, and hammer shafts. If exceptionally dirty apply a few drops of oil to the shaft while running and then wipe completely dry. Wipe off all dust, lint and paper shavings. Special attention should be paid to the keyways in the print cylinder shaft.	

TABLE 5-8. MAINTENANCE STANDARDS (Cont)

REFERENCE NO.	MAINTENANCE STANDARDS	ADJUSTMENT PARAGRAPH NO.
A10	INSPECT PRINTER UNIT CAUTION NEVER INCREASE TENSION ON PRINT HAMMER FOR DARKER COPY. REPLACE RIBBON IF DARKER COPY IS DESIRED. Inspect ribbon for wear and frayed edges. Inspect cables for fraying, wear, or cuts.	
	Check print hammer disconnect adjustment if ribbon replacement does not provide darker copy.	5-5e(15)
A11	CHECK PAPER SUPPLY	
	Ensure that sufficient paper is on roll and that it is properly installed.	3-3c(3)
A12	LUBRICATION CAUTION NEVER LUBRICATE THE CYLINDER, HAMMER OR YOKE SHAFTS. (REFER TO LUBRICATION SCHEDULE.)	Refer to Table 5-9
A13	DISASSEMBLE AND INSPECT PRINTER UNIT Use only low pressure air to clean unit. Ensure that springs are not disengaged or lost.	5-5(g)
	Disassemble printer unit into four major assemblies. Inspect for loose, broken, or worn parts. Clean off all excessive oil and grease. (Make a diagram of timing mark alignment, before removing mainshaft from frame. Refer to Figure 4-11 for location of timing marks.)	5-5(g)
A13a	INSPECT MAINSHAFT Clean off all excessive grease and oil from clutches and the area between the clutches. Check to ensure that all cages move freely, and relubricate with oil.	
A13b	REASSEMBLE PRINTER UNIT Replace all worn, broken, or missing parts as required. Check for proper alignment of timing marks on mainshaft and timing shaft when reassembling front and rear halves of printer. (Refer to timing mark diagram prepared during disassembly.)	
A14	SELECTOR MECHANISM Remove the selector and clean in residue free solvent. Check that no foreign matter remains on poles or armatures. Relubricate bearings and felts with oil, place one drop of oil on carbide surfaces. Replace selector in printer.	
A15	MOTOR ASSEMBLY	
	Remove motor and inspect first reduction gear and pinion gear for wear or damage. Lubricate gears with grease prior to reassembly.	5-5(g)(2)(a) and (b)

TABLE 5-8. MAINTENANCE STANDARDS (Cont)

REFERENCE NO.	MAINTENANCE STANDARDS	ADJUSTMENT PARAGRAPH NO.
A16	CHECK ADJUSTMENTS The following adjustments should be checked and readjusted if necessary.	
	a. Function Slide Alignment	5-5e(3)(b) and 5-5e(4)(b)
	b. Start Clutch Release	5-5e(5)
	c. Selector	5-5e(17)
	d. Rotary and Lateral Stroke	5-5e(18)(a) and (b)
	e. First Character	5-5e(23)
	f. Character Advance	5-5e(8)
	g. Automatic CR & LF	5-5e(9)(b)
A17	CHECK FOR PROPER OPERATION OF FUNCTIONS NOTE If functions do not operate, check slide and stroke adjustments prior to checking individual function clutches and linkages. Blank Space Line Feed Figures Bell Letters Carriage Return	5-5e(3)(b) 5-5e(4)(b) 5-5e(18)(a) 5-5e(18)(b)
A18	MASTER PULSING CONTACTS Continuously transmit the letter "R". This checks the upper contact screw adjustment. Continuously transmit the letter "Y". This checks the lower contact screw adjustment.	5-5e(24)(i) or 5-5e(26)(b)
A19	KEYBOARD INSPECTION Inspect the keyboard for worn, broken or loose parts. Check for accumulation of dirt and grease. Clean keyboard with a lint-free cloth and relubricate using oil on all linkages and grease on keyboard drive gear.	
A20	INSPECT CHASSIS Inspect the chassis for loose components and frayed or damaged wiring. Check for proper fuses and proper patching for mode of operation required. Wipe off all excess oil and grease on the chassis.	
A21	SHOCK MOUNT Inspect shock mount for security. Check that no foreign matter is interfering with operation of the shock mount.	
A22	MEASURE PRIMARY POWER SOURCE Set Multimeter AN/PSM-4 to measure a-c voltage of 0 to 250 volts; connect leads across primary power source and check for correct primary power.	

TABLE 5-8. MAINTENANCE STANDARDS (Cont)

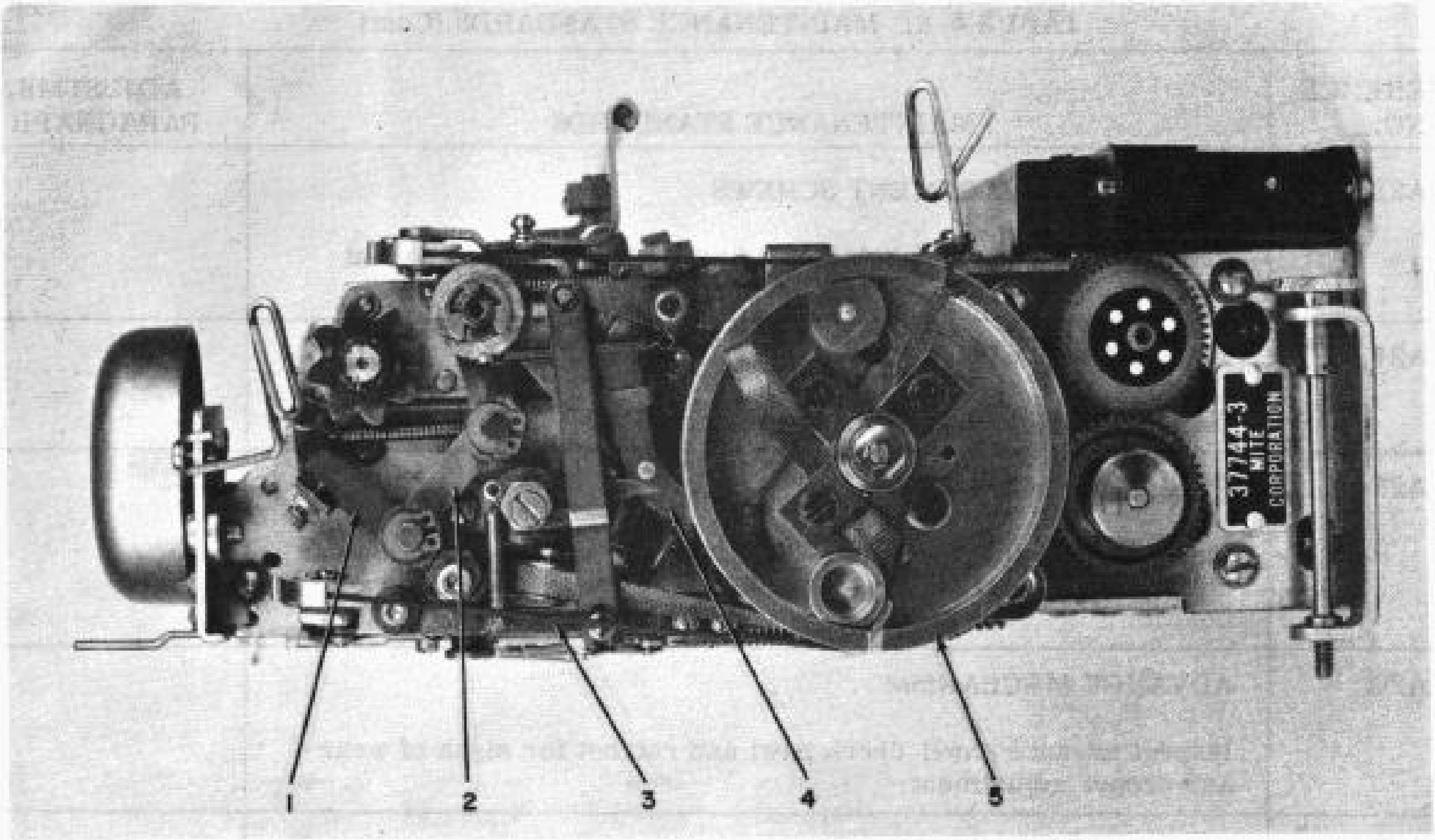
REFERENCE NO.	MAINTENANCE STANDARDS	ADJUSTMENT PARAGRAPH NO.
A23	SELECTOR ADJUSTMENT SCREWS Inspect the eleven (11) selector adjustment screws to see that they are locked tight by their locknuts.	
A24	FUNCTION TIMING CAM Inspect function timing cam for wear.	
A25	FUNCTION BAR ADJUSTMENT Inspect to see that there is 1/32" clearance between function bar and sensing finger, when function cam follower is on high cam position.	
A26	ADVANCE MECHANISM Inspect advance pawl, check pawl and ratchet for signs of wear and proper adjustment.	
A27	RIBBON FEED MECHANISM Inspect to see that ribbon reverses properly and is threaded correctly.	
A28	RUNNING ADJUSTMENT CHECKS (using external signal source) a. 1st character spacing. b. Rotary detent for index wheel bounce. c. Print and advance prevent; that no print or advance occurs during functions. d. Auto. CR & LF: that CR and LF occur after 72 or 76 characters.	

d. SCHEDULED MAINTENANCE. - The following schedules should be followed when checking for wear of parts at the end of 3 week, 6 week, and 9 week intervals of operation. The parts should be replaced if there is any indication that they may become unserviceable during the next 3 weeks of operation. Refer to the appropriate disassembly, or replacement procedure.

SCHEDULED MAINTENANCE

3 WEEK CYCLE

PART NAME	3 WEEK AREA TO CHECK	INDICATION THAT REPLACEMENT PROCEDURE IS NECESSARY
Character advance pawl (4, Figure 5-1)	Tip (where pawl engages the advance ratchet).	Rounded tip, improper spacing across the line, overprinting of characters.
Check pawl (3, Figure 5-1)	Tip (where pawl engages advance ratchet).	Rounded tip, improper spacing across the line, overprinting of characters.
Advance drum and advance ratchet (5, Figure 5-1)	Advance drum inner cable groove and advance ratchet.	Damage to inner cable groove in drum, worn or chipped advance ratchet teeth.

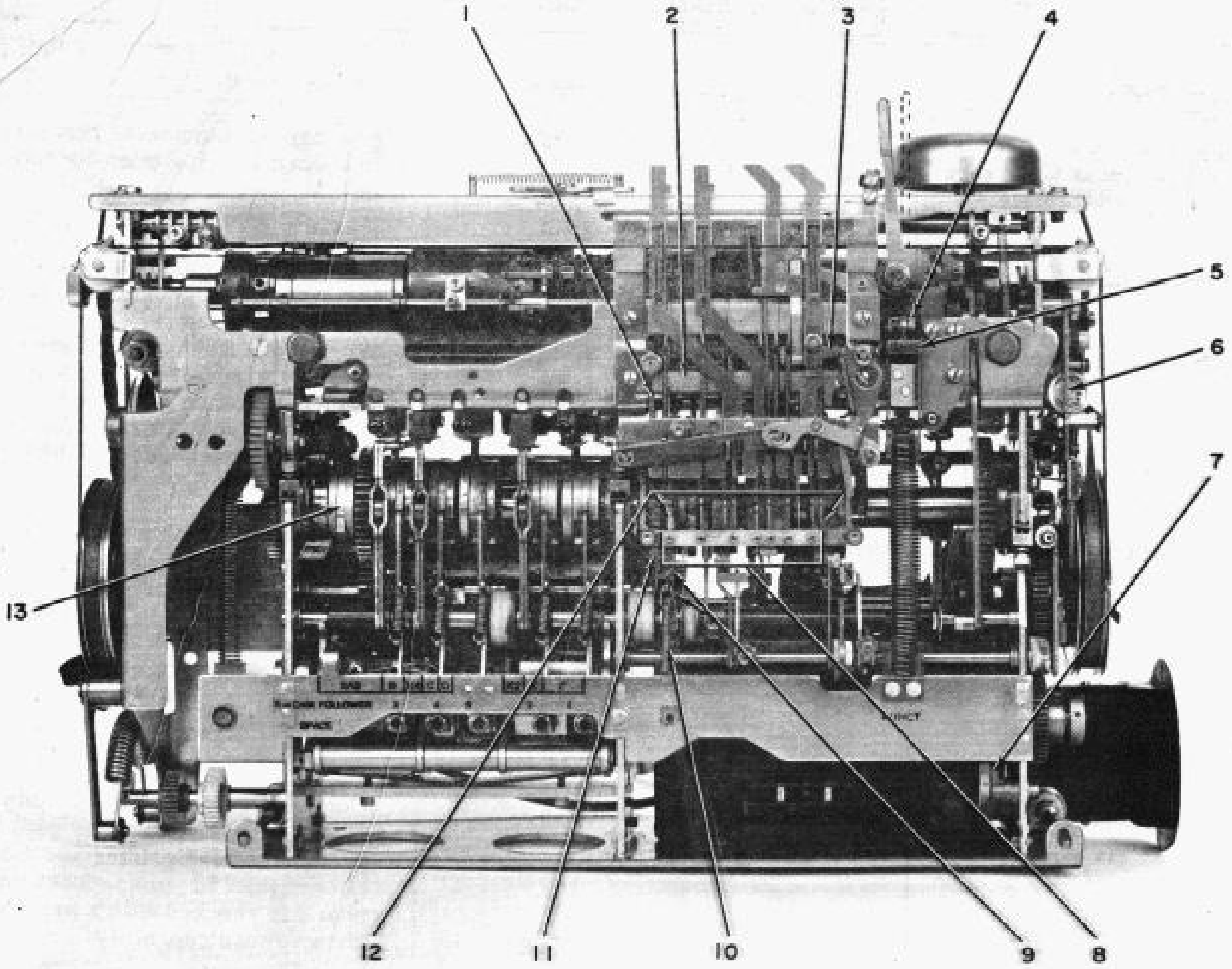


KEY	ITEM
1	Rotary Detent Actuator
2	Index Link
3	Hammer Cable (Green)
4	Advance Feed Pawl
5	Advance Drum

Figure 5-1. Scheduled Maintenance (Right Side View of Printer)

SCHEDULED MAINTENANCE (Cont)

PART NAME	3 WEEK AREA TO CHECK	INDICATION THAT REPLACEMENT PROCEDURE IS NECESSARY
Motor pinion and first reduction gear (7, Figure 5-2)(located within housing)	Teeth of pinion and first Reduction Gear, where they engage.	Excessively worn teeth resulting in abnormal noise when operating.
Hammer face (7, Figure 5-3)	Bond between hammer face and hammer assembly.	Separation of rubber between hammer face and hammer assembly.
Index link (2, Figure 5-1)	Index Link bearings.	Worn index link bearings are indicated by excessive movement of the index link or inability to maintain 0.010 inch clearance between the rotary detent pin and the tips of index wheel.
Rotary detent actuator (1, Figure 5-1)	Actuator bearing.	Check bearing for wear, indicated by excessive side movement or end play of the actuator.
Contact block assembly	Contact points in contact block (located in chassis).	Check contacts for wear. Check self-shorting contact for continuity when keyboard is removed. Check continuity on leads wired to the contact.
Master pulsing contacts	Contacts located in keyboard actuated by master pulsing cam follower.	Contacts worn or bent to a point where keyboard output is not accepted by the printer and range is less than 70 points, when keyboard is checked with a printer of known range capability.
Keyboard pulsing contacts	Contacts located in keyboard actuated by pulsing cam followers.	Gap between contacts cannot be maintained due to metal fatigue in contact leaves.
Lateral and Rotary Positioning. Lateral belts, hammer, rotary, and return cables. Ribbon feed drive shaft bearing.	Check near pulleys and clamping areas. Ribbon Feed Drive Shaft Bracket.	Worn, frayed or cut sections of belts or cables. Worn or loose.
All screws, springs and retaining rings.	Screw heads and threads; spring loops and main body; retaining rings.	Check screws for damaged threads and heads, spring loops and main body for damage or distortion; retaining rings for secure positioning.
6 WEEK CYCLE		
	6 WEEK AREA TO CHECK	
Special function bar screws (Delrin)(3, Figure 5-2)	Screw Heads (white) holding function bar to function section.	Replace every 1500 hours.
Function clutch release spring (10, Figure 5-2)	Spring loops and/or main spring body.	Functions are repeated. Inability to select functions. Check for distortion of spring loops and/or main spring body.

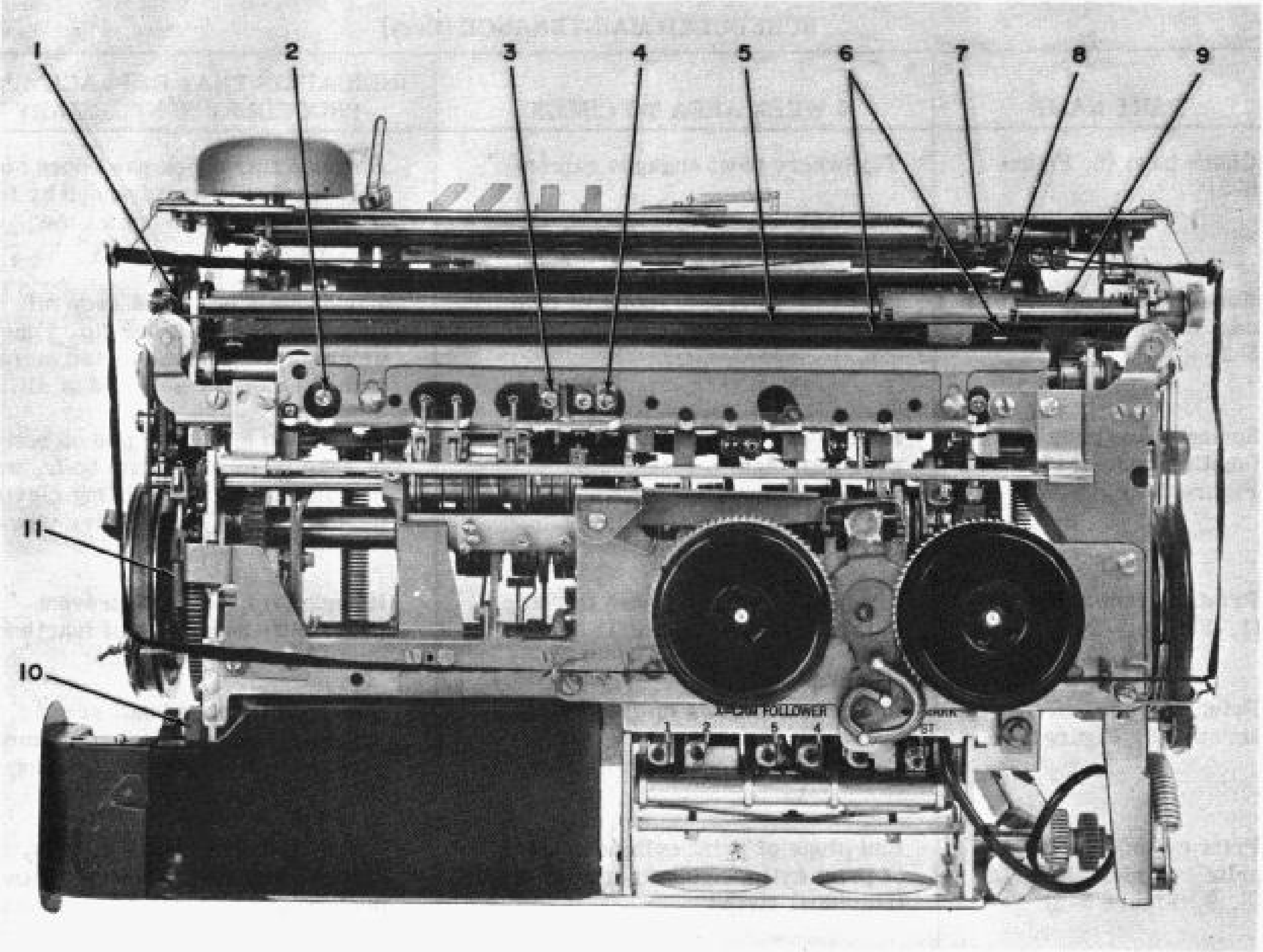


KEY	ITEM
1	Print Prevent Arm
2	Sensing Finger Stop Strip
3	Function Bar
4	Function Lever Assembly
5	Spring Yoke and Retaining Plate
6	Check Pawl
7	Motor Pinion First Reduction Gear Housing
8	Print Prevent Bail Screws
9	Function Timing Cam and Cam Follower
10	Function Clutch Release Spring
11	Print Function Clutch
12	Function Sensing Fingers
13	Start Clutch

Figure 5-2. Scheduled Maintenance (Bottom View of Printer)

SCHEDULED MAINTENANCE (Cont)

PART NAME	6 WEEK AREA TO CHECK	INDICATION THAT REPLACEMENT PROCEDURE IS NECESSARY
Check pawl (6, Figure 5-2)	Tip (where pawl engages ratchet).	Rounded tip, check pawl does not hold ratchet when advanced by feed pawl. Motor shut-down time excessive.
Function timing cam and cam follower (9, Figure 5-2)	Check cam surface (point of cam drop off) and tip of cam follower.	Worn cam surface (at drop off point) or cam follower tip. Functions or characters are selected more than once or not selected at all.
Spring yoke (print and function spring) (5, Figure 5-2)	Rubber pad on spring yoke and yoke bearings.	Separation of rubber pad on bottom of yoke from yoke main body, worn bearings, and loose fitting clevis pins resulting in excessive vibration during operation.
Print prevent arm (1, Figure 5-2)	Tip (point of contact with the step in the print prevent bail).	Rounded tip, no print prevent (intermittent printing of functions) during function selection.
Print prevent bail screws (8, Figure 5-2)	Check bail screws on the print prevent bail.	Check for stripped bail screws, will not retain correct adjustment, printing is not prevented during function selection.
Print cylinder and print cylinder shaft, (8, 9, Figure 5-3)	End plugs of print cylinder, surface of print cylinder shaft, and individual strips.	Worn print cylinder end plugs, resulting in excessive end play and poor rotary positioning. Worn or damaged print cylinder shaft resulting in poor carriage return or lateral positioning (printed copy). Damaged print strap results in poor printed copy.
Lateral and Rotary Positioning. Lateral belts, hammer rotary and return cables.	Check near pulleys and clamping areas.	Worn, frayed or cut sections of belts and cables.
All screws, springs and retaining rings.	Screw heads and threads; spring loops and main body; retaining rings.	Check screws for damaged threads and heads, spring loops and main body for damage or distortion; retaining rings for secure positioning.
	9 WEEK CYCLE	
	9 WEEK AREA TO CHECK	
Speed change gear (10, Figure 5-3)	Teeth of speed change gear.	Check for worn or damaged teeth.
Start clutch (13, Figure 5-2)	Cam surface, carbide inserts (above jamming rollers).	Cam surface worn, carbide inserts dislodged from clutch housing, start clutch will not rotate (release).
Print-function clutch (11, Figure 5-2)	Print-function clutch cams, carbide inserts.	Cam surfaces worn, carbide inserts dislodged from clutch housing, clutch jammed, rotates continuously or will not engage.



KEY	ITEM
1	Rotary Cable
2	Lifter Arm Clamp Screw
3	Function Cam Follower Clamp Screw
4	Print Cam Follower Clamp Screw
5	Return Cable
6	Lateral Belt
7	Hammer Face
8	Print Cylinder
9	Print Cylinder Shaft
10	Speed Change Gear
11	Bounce Prevent Lever

Figure 5-3. Scheduled Maintenance (Top View of Printer)

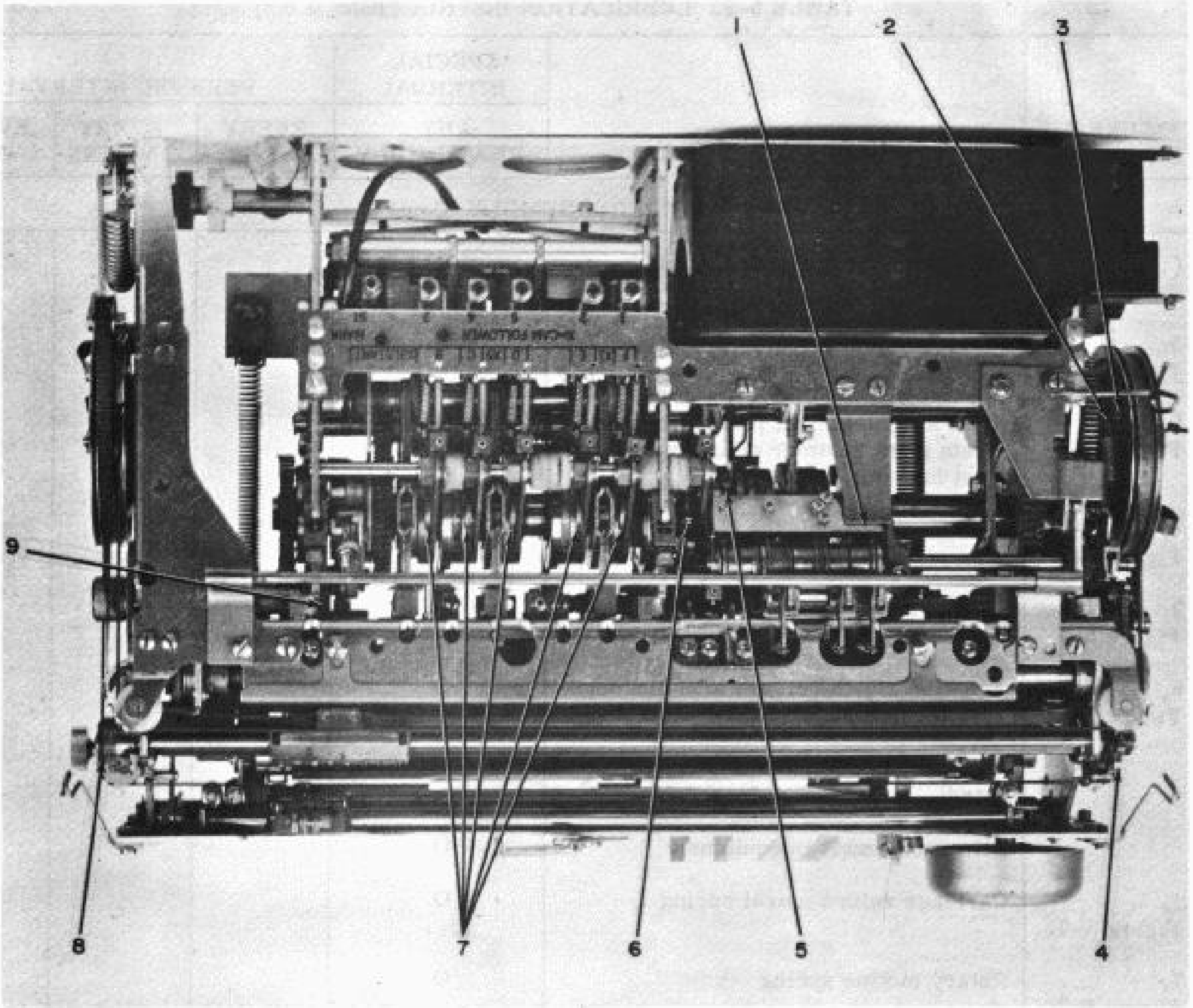
SCHEDULED MAINTENANCE (Cont)

PART NAME	9 WEEK AREA TO CHECK	INDICATION THAT REPLACEMENT PROCEDURE IS NECESSARY
Print and function cam followers (4, 3, Figure 5-3)	Check carbide cam follower tips at point of contact with their respective cams.	Check for excessive wear on cam followers and their respective cams. Normally when a cam follower is replaced the clutch on which it rides should also be replaced.
Function bar (3, Figure 5-2)	Leading edge of function bar, fit of function bar guide pins.	Worn leading edge on function bar, loose fit of function bar on guide pins.
Function lever assembly (4, Figure 5-2)	Oilite bearings and pins in function lever assembly.	Worn Oilite bearings and guide pins in function lever assembly. The function bar will usually show signs of wear when above conditions are present.
Lifter arm (2, Figure 5-3)	Lifter arm clamp and point of contact (tip of lifter arm) with slot in function lever assembly.	Lifter arm clamp does not hold function shaft, no function selection. Worn tip of lifter arm permits excessive lateral movement of the function lever assembly.
Bounce prevent lever (11, Figure 5-3)	Check first tooth and clamp of bounce lever.	Worn first tooth and/or clamp on bounce lever results in continuous automatic carriage return and line feed after printing a few characters on the line.
Lateral belts; hammer, rotary, and return cables (6, 1, 5, Figure 5-3)	Check belt and cables near pulleys.	Worn, frayed, or cut sections of belt or cables.
Sensing finger stop strip (2, Figure 5-2)	Check inner surface of stop strip (top).	Grooves worn in inner surface of stop strip or stop strip bent from jammed sensing fingers.
U Bars and sensing fingers (12, Figure 5-2)	Pin holding sensing finger to U bar.	Pin holding sensing finger to U bar is worn resulting in excess play and non-selection of functions.
All screws, springs and retaining rings.	Screw heads and threads; spring loop main spring body, and retaining rings.	Check screw heads for damage, threads for distortion, spring loops and main spring body for damage or distortion, retaining rings for security.

e. LUBRICATION. - The normal lubrication interval for Teleprinter Sets AN/UGC-38 and AN/UGC-40 and Teletypewriter Set AN/UGC-41 is 500 hours (3 weeks). If, however, a unit is operated under high temperature and high humidity conditions, the lubrication interval should be shortened to 250 hours (approximately 1-1/2 weeks). Non-fluid Oil (FSN 5815-869-9148), MITE Corporation Part Number 34304, is used on all parts except the gear train and the tips of the cam followers. The gear train and cam follower tips are lubricated with grease. (MITE Corporation Part Number 5041-1) MIL-G-3278A. Refer to Table 5-9, and Figures 5-4 through 5-10, Lubrication Instructions, for the teletypewriter and teleprinter sets.

TABLE 5-9. LUBRICATION INSTRUCTIONS

FIGURE & INDEX NO.	LUBRICATION POINT	SPECIAL INTERVAL	PERIODIC INTERVALS		
		ANY REASSEMBLY	EVERY WEEK	EVERY 3 WEEKS	EVERY 6 WEEKS
	O = Oil, Non-fluid, MITE P/N 34304, 1N 5815-869-9148 G = Grease, MITE P/N 05041-0001				
	PRINTER ASSEMBLY				
4, Figure 5-4	Index wheel	G	G		
3, Figure 5-4	Advance ratchet	O		O	
5, Figure 5-5	Advance suppression latch (where character advance pawl contacts)	O	O		
7, Figure 5-5	Advance suppression latch eccentric bushing	O	O		
5, Figure 5-5	Advance prevent lever tab (where character advance pawl contacts)	O		O	
4, Figure 5-5	Carriage return lever and advance prevent lever tab (point of contact)	O		O	
1, Figure 5-5	Rotary detent pawl eccentric bushing	O	O		
8, 2, Figure 5-5	Bushings and pivots on link between rotary detent pawl and function shaft terminal lever	O	O		
9, Figure 5-5	Rotary detent pawl adjustment screw tip	O	O		
6, Figure 5-5	Check pawl tip	O	O		
3, Figure 5-5	Character advance pawl bushing	O	O		
2, Figure 5-4	V lever tab which meets pin in advance drum	O			O
7, 3, Figure 5-6	Bushings at both ends of V lever shaft	O			O
2, Figure 5-6	First character adjustment screw (contact point)	O		O	
	Right-hand and left-hand bearings	O		O	
8, Figure 5-4	Rotary motion spring retainer grip ring	O		O	
9, Figure 5-4	Range adjustment gear segment (on start clutch assembly)	O			O

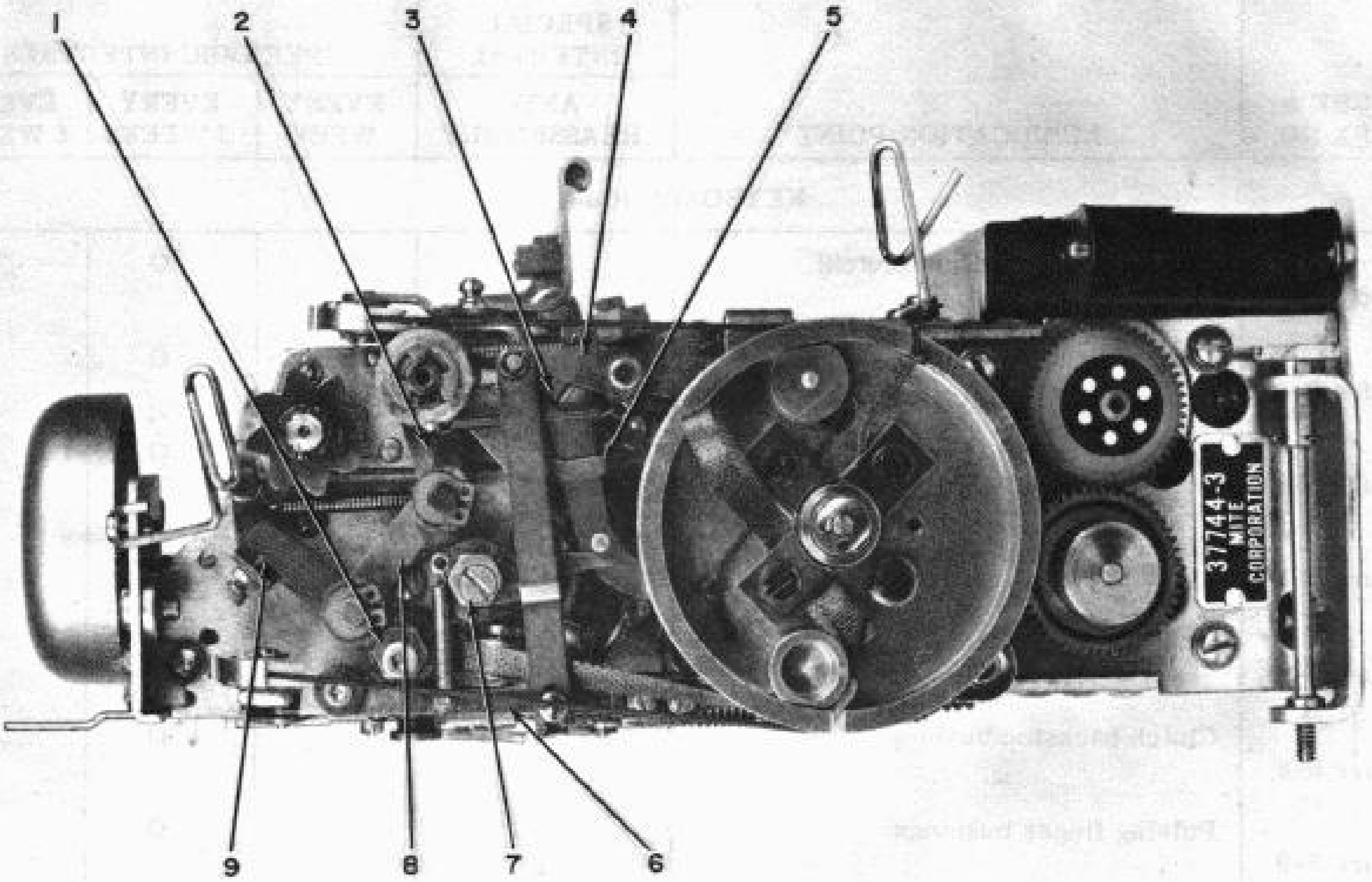


KEY	ITEM
1	Advance Prevent Stop Spring (point of contact with advance prevent bail)
2	V Lever Tab
3	Advance Ratchet
4	Index Wheel
5	Function Cam Follower
6	Print Cam Follower Tip
7	Clutch Release Finger and Cam Follower Surfaces
8	Rotary Motion Spring Retainer
9	Range Adjustment Gear Segment

Figure 5-4. Lubrication (Top View of Printer, Ribbon Assembly Removed)

TABLE 5-9. LUBRICATION INSTRUCTIONS (Cont)

FIGURE & INDEX NO.	LUBRICATION POINT	SPECIAL INTERVAL	PERIODIC INTERVALS		
		ANY REASSEMBLY	EVERY WEEK	EVERY 3 WEEKS	EVERY 6 WEEKS
	PRINTER ASSEMBLY (Cont)				
6, Figure 5-7	Print hammer actuator link guide bracket	G			G
3, Figure 5-7	Print hammer actuator link pivot	O	O		
5, Figure 5-7	Print shaft terminal lever (where it meets print hammer actuator link and print hammer release)	G	G		
4, Figure 5-7	Print hammer release bushing	O		O	
2, Figure 5-7	Takeup arm bushing	O	O		
6, Figure 5-6	Function clutch release arm bushings	O		O	
	All gears in equipment (except where noted)	G	G		
	All spring loops in equipment	O			O
1, Figure 5-7	Carriage return spiral spring	O			
7, Figure 5-7	Rotary motion spring	O			O
1, Figure 5-4	Advance prevent stop spring (where it engages bail)	O			O
1, Figure 5-6	Off-line function slide levers	O			O
6, Figure 5-4	Print cam follower tip	G			O
5, Figure 5-4	Function cam follower tip	G			O
7, Figure 5-4	Clutch release finger and cam follower surfaces	O			O
5, Figure 5-6	Lock lever eccentric bushing	O		O	
4, Figure 5-6	Lock lever tip	G			G
	KEYBOARD				
1, Figure 5-8	Keyboard cam wick	O		O	

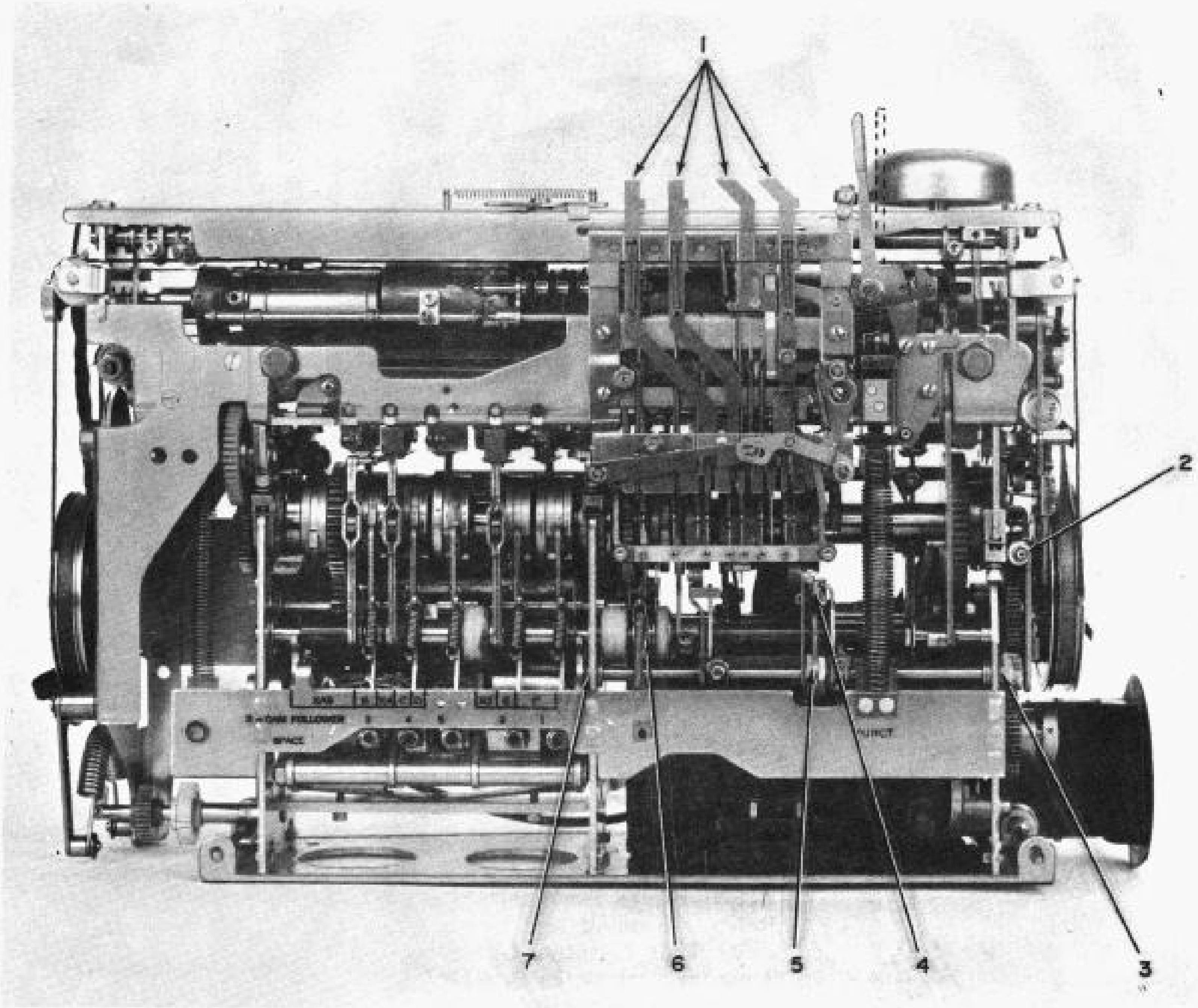


KEY	ITEM
1	Rotary Detent Pawl Eccentric Bushing
2	Function Shaft Terminal Lever
3	Character Advance Pawl Bushing
4	Carriage Return Lever and Advance Prevent Lever Tab (point of contact)
5	Advance Suppression Latch (where character advance pawl contacts)
6	Check Pawl Tip
7	Advance Suppression Latch Eccentric Bushing
8	Bushings and Pivots
9	Rotary Detent Pawl Adjustment Screw Tip

Figure 5-5. Lubrication (Right Side View of Printer)

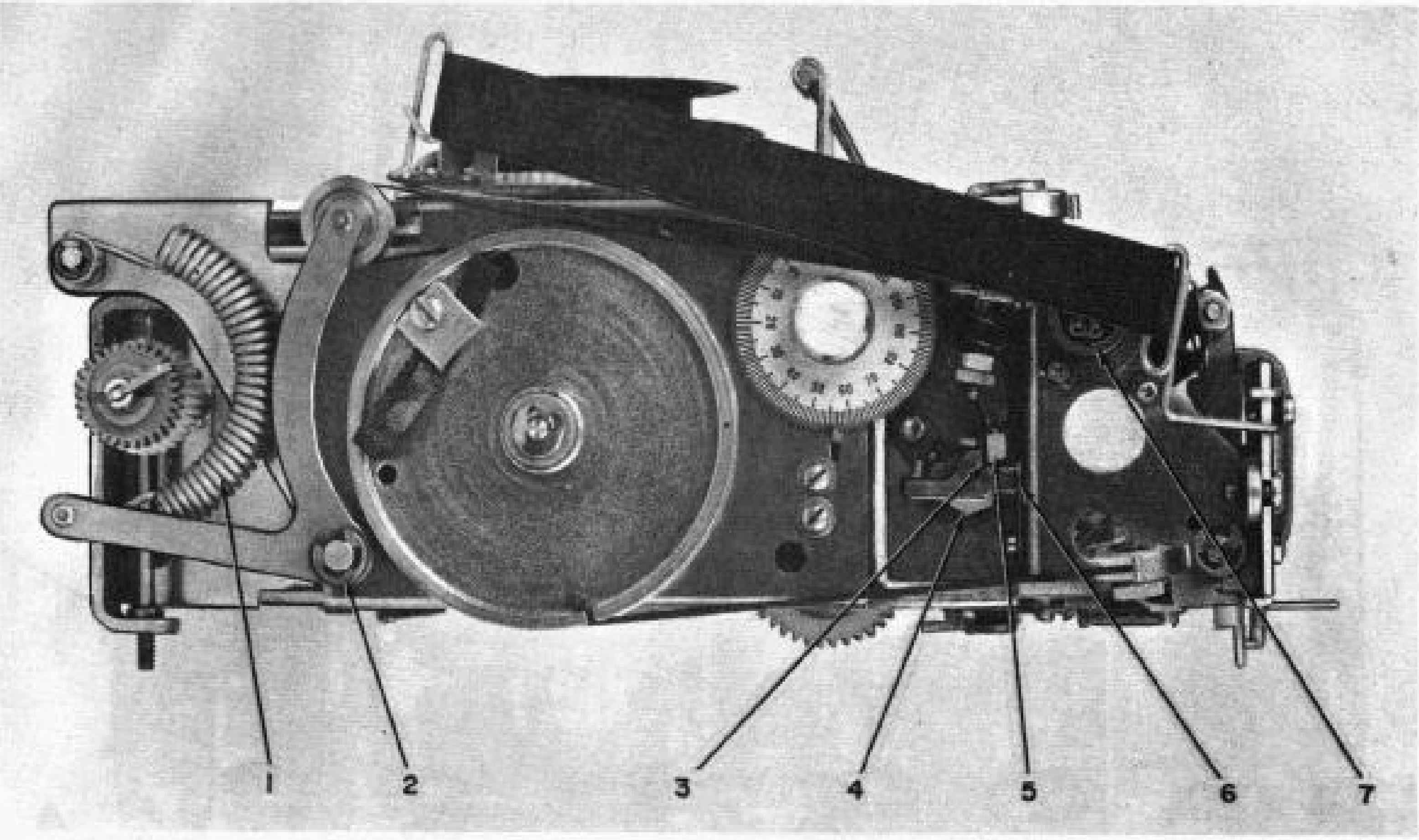
TABLE 5-9. LUBRICATION INSTRUCTIONS (Cont)

FIGURE & INDEX NO.	LUBRICATION POINT	SPECIAL INTERVAL	PERIODIC INTERVALS		
		ANY REASSEMBLY	EVERY WEEK	EVERY 3 WEEKS	EVERY 6 WEEKS
	KEYBOARD (Cont)				
4, Figure 5-8	Clutch rollers (within clutch)	O		O	
5, Figure 5-8	Clutch backstop surface	O		O	
2, Figure 5-8	Keyboard code bar prevent lever cam	O		O	
3, Figure 5-8	Clutch release cam	O		O	
7, Figure 5-8	Clutch release cam follower eccentric	O		O	
6, Figure 5-8	Clutch backstop bushing	O		O	
4, Figure 5-9	Pulsing finger bushings	O		O	
2, Figure 5-9	Key lever leaf springs (where they contact key levers)	O			O
5, Figure 5-9	Clutch release bail bearings	O		O	
1, 3, Figure 5-9	Repeat key shaft ends	O			O
5, Figure 5-8	Clutch backstop surfaces	O			O
	RIBBON FEED MECHANISM				
3, Figure 5-10	Check pawl pivot	O	O		
4, Figure 5-10	Feed pawl pivot	O	O		
6, Figure 5-10	Drive lever pivot	O	O		
5, Figure 5-10	Drive lever spring	O	O		
2, Figure 5-10	Check pawl spring loops	O	O		
1, Figure 5-10	Feed pawl spring loops	O	O		
8, Figure 5-10	Drive shaft bearings	O	O		
7, Figure 5-10	Feed cam	O	O		



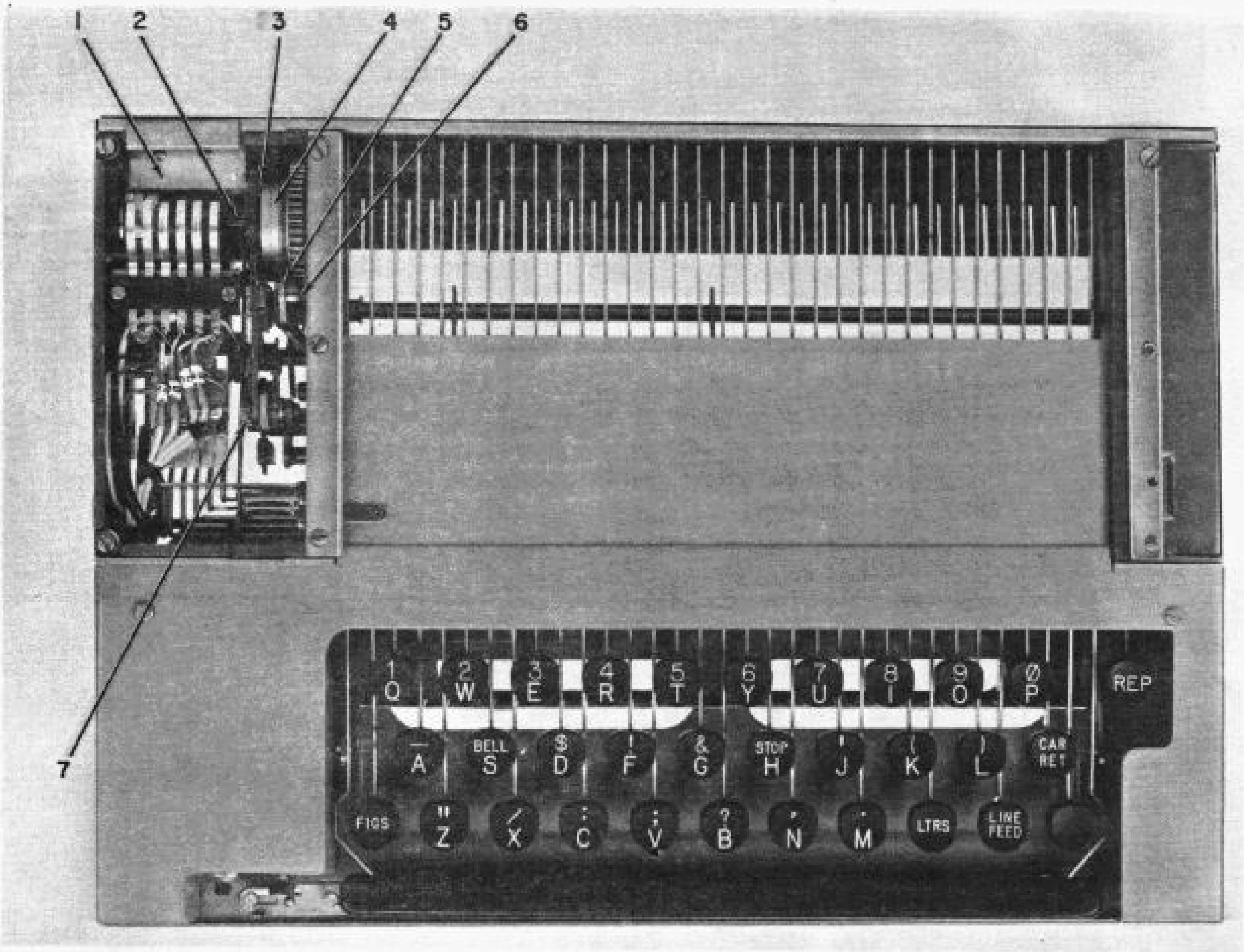
KEY	ITEM
1	Off-Line Function Slide Levers
2	First Character Adjustment Screw (contact point)
3	Bushings (at both ends of V Lever Shaft)
4	Lock Lever Tip
5	Lock Lever Eccentric Bushing
6	Function Clutch Release Arm Bushings
7	Bushings (at both ends of V Lever Shaft)

Figure 5-6. Lubrication (Bottom View of Printer)



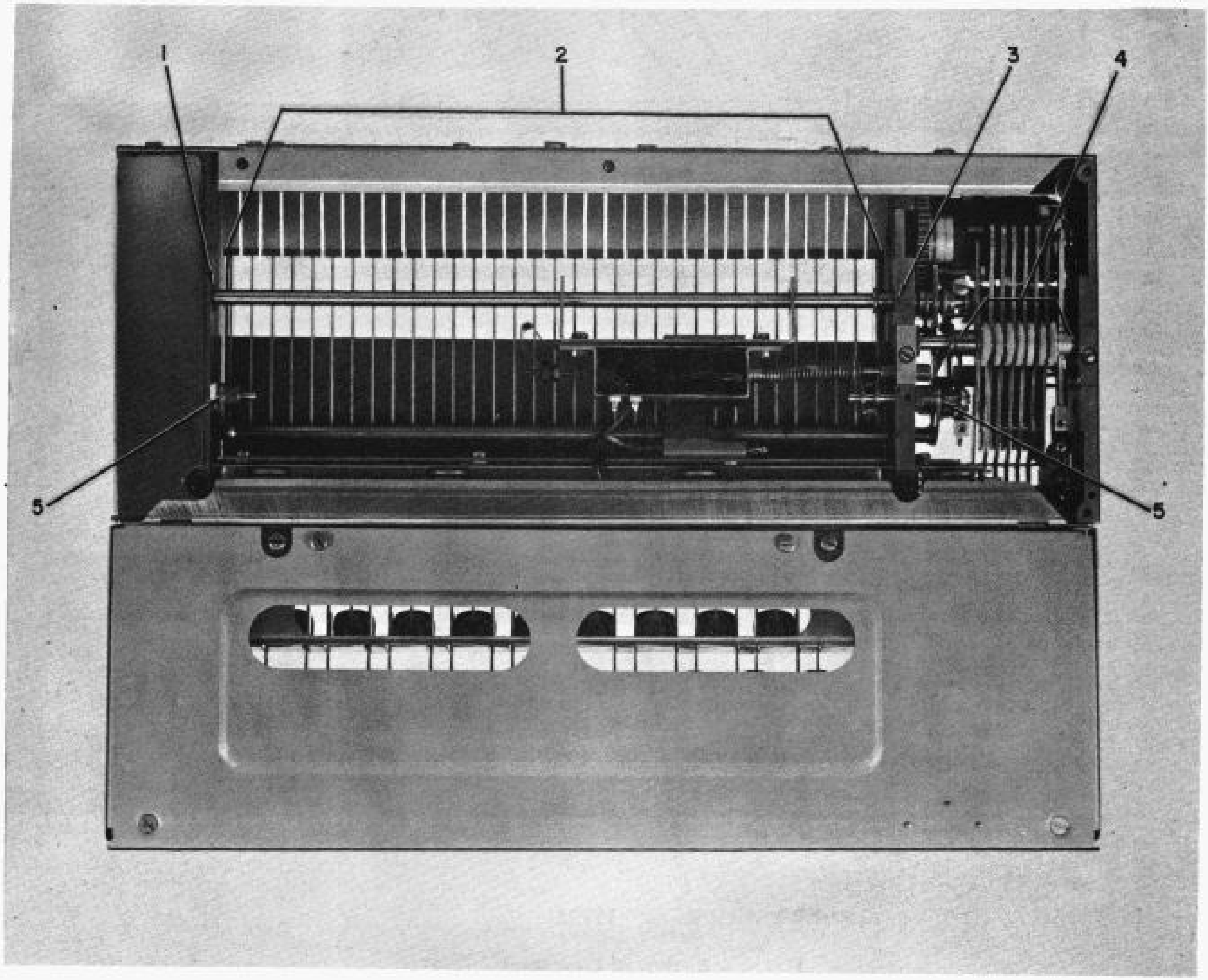
KEY	ITEM
1	Carriage Return Spiral Spring
2	Takeup Arm Bushing
3	Actuator Link Pivot
4	Release Bushing
5	Print Shaft Terminal Lever
6	Actuator Link Guide Bracket
7	Rotary Motion Spring

Figure 5-7. Lubrication (Left Side View of Printer)



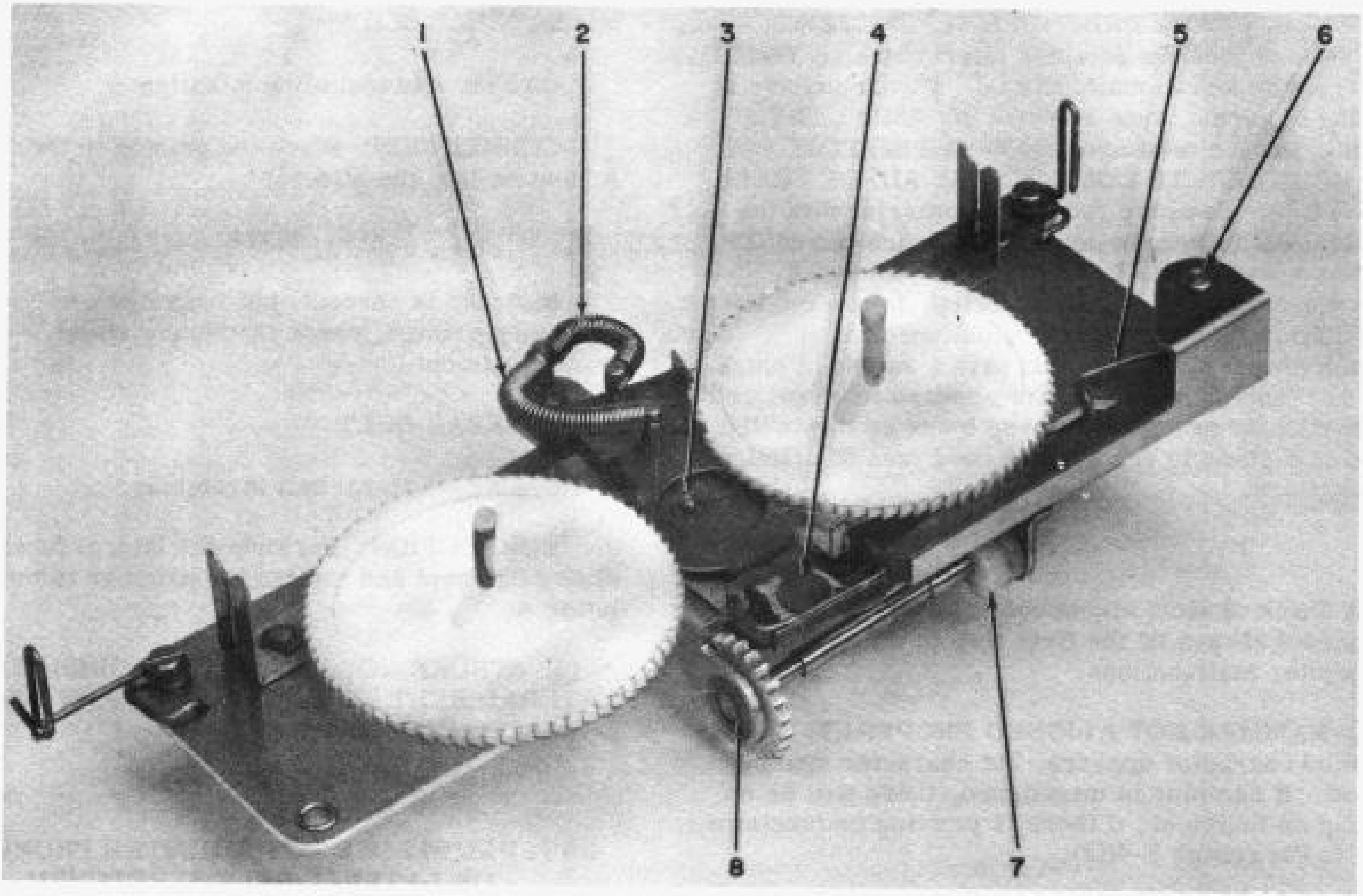
KEY	ITEM
1	Keyboard Cam Wick
2	Keyboard Code Bar Prevent Lever Cam
3	Clutch Release Cam
4	Clutch Cage (rollers inside)
5	Clutch Backstop Surface
6	Clutch Backstop Bushing
7	Clutch Release Cam Follower Eccentric Bushing

Figure 5-8. Lubrication (Top View of Keyboard)



KEY	ITEM
1	Repeat Key Shaft End
2	Key Lever Leaf Spring (where they contact key lever)
3	Repeat Key Shaft End
4	Pulsing Finger Bushings
5	Clutch Release Bail Bearing

Figure 5-9. Lubrication (Bottom View of Keyboard)



KEY	ITEM
1	Feed Pawl Spring Loops
2	Check Pawl Spring Loops
3	Check Pawl Pivot
4	Feed Pawl Pivot
5	Drive Lever Spring
6	Drive Lever Pivot
7	Feed Cam
8	Drive Shaft Bearings

Figure 5-10. Lubrication (Ribbon Feed Assembly)

f. ISOLATION OF PRINTER MALFUNCTIONS. - This section contains samples of printed copy from printers with known malfunctions. If your printer is starting to garble, type a series of "AM's", "RY's", "OU's", and the message, "NOW IS THE TIME FOR ALL GOOD MEN TO COME TO THE AID OF THEIR COUNTRY." Compare this typed material with the samples that follow, noting exactly which one of the samples corresponds to the material just typed. When the correct sample is selected, follow the instructions given to correct the malfunction.

Each of these samples will have a series of notes, such as; "only half a character appears to be printed". Pay particular attention to these notes as they will serve as a guide in recognizing the cause of printing malfunctions.

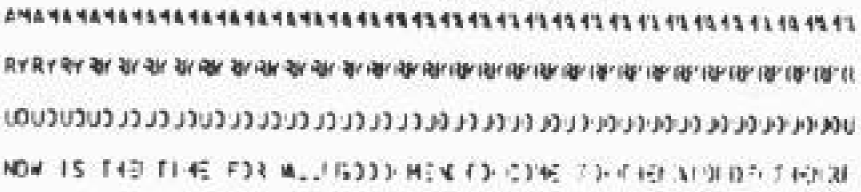
NOTE

A check of slide alignment in letters A should always be the first step in diagnosing printer malfunctions.

(1) HAMMER NOT ALIGNED PROPERLY. - Half a printed character appears, but character spacing is good. If hammer is misaligned, there will be no printing on functions; if there is printing on functions, refer to Paragraph 5-4f(2).

SAMPLE 1

HAMMER MISALIGNMENT



CAUSE: Hammer slipping on hammer cable.

CORRECTION:

Step 1. Put the printer in letter "A" and check hammer alignment with the letter "A".

Step 2. With the printer in letter "A", loosen hammer cable on the advance drum.

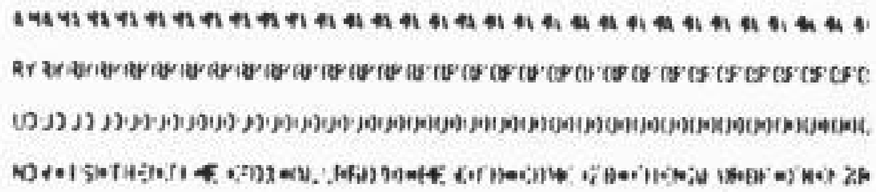
Step 3. Reloop hammer cable around the tabs on hammer in the form of a figure eight, maintaining hammer alignment with the letter "A".

Step 4. Replace hammer cable under its clamp on advance drum and tighten cable clamp.

(2) LATERAL SLIDE NOT ALIGNED PROPERLY OR LATERAL BELT STRETCHED. - Half characters will appear to print over one another. When slide misalignment is extreme, function characters will print with alpha-numeric characters.

SAMPLE 2

LATERAL SLIDE MISALIGNED OR
LATERAL BELT STRETCHED



(a) LATERAL SLIDE

CAUSE: Lateral slide misaligned.

CORRECTION: Place the printer in the letters A, and realign the slides.

NOTE

If stroke is correct, but functions are being printed, check the rotary slide adjustment.

(b) LATERAL BELT

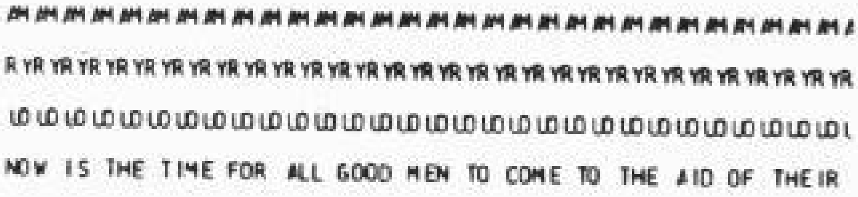
CAUSE: Lateral belt stretching.

CORRECTION: Perform the lateral function slide alignment and realign the hammer to the letter A.

(3) STROKE NOT ADJUSTED PROPERLY OR LATERAL BELT STRETCHED. - Uneven spacing between certain characters.

SAMPLE 3

LATERAL STROKE NOT ADJUSTED PROPERLY
OR LATERAL BELT STRETCHED



(a) LATERAL STROKE

CAUSE: Lateral stroke screws loose or improperly adjusted.

CORRECTION: Check slide alignment in letters A. Perform lateral stroke adjustment.

(b) LATERAL BELT

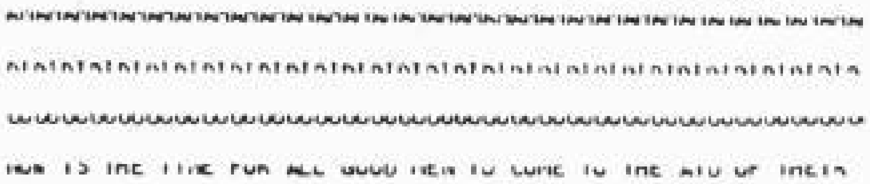
CAUSE: Lateral belt stretching.

CORRECTION: Check slide alignment in letters A, realign slides if necessary. Check lateral belt adjustments.

(4) HAMMER FACE NOT PROPERLY ALIGNED WITH CHARACTER STRIPS; ROTARY CABLE OR ROTARY DETENT PAWL IMPROPERLY ADJUSTED. - The upper or lower portion of the character may appear light or does not print.

SAMPLE 4

HAMMER FACE NOT PROPERLY ALIGNED



(a) HAMMER FACE

CAUSE: Hammer face on the hammer assembly not properly aligned to the cylinder or rotary cable not adjusted properly or distorted ribbon guide.

CORRECTION: Readjust hammer face, rotary cable, or form ribbon guide parallel to hammer face (should not hit paper guide).

(b) ROTARY CABLE

CAUSE: Rotary cable stretching.

CORRECTION: Check rotary cable adjustments.

(c) ROTARY DETENT PAWL

CAUSE: No index wheel clearance.

CORRECTION: Check rotary detent pawl adjustment.

5-4. LOGICAL TROUBLE SHOOTING.

The overall trouble shooting tables group the equipment as follows: Equipment Already In Use; Equipment of Unknown Condition; and Newly Installed Equipment. The technician chooses the category into which the defective equipment belongs and follows the step-by-step procedures of the applicable table. If the preliminary procedures as outlined do not isolate the malfunction, the technician is instructed to proceed to the System Trouble Shooting Chart which lists the most often encountered symptoms of trouble, together with probable causes and corrective actions.

The functional section trouble shooting tables list the most often encountered symptoms, their probable causes, and corrective actions. The corrective actions provide detailed directions to perform adjustments, make voltage and continuity checks, check for obvious damage, or check for incorrect switch settings.

To further assist in isolating malfunctions, both overall and detailed functional descriptions are provided, supported by functional block diagrams, servicing block diagrams, and simplified schematic diagrams.

Test points and significant waveforms are provided on both servicing block diagrams and parts location drawings for use with functional section trouble shooting tables.

The most rapid method of correcting a malfunction and getting the equipment back into operation is to replace entire defective units (keyboard, electronic module or transformer) with known good replacement units and then to perform the trouble shooting procedures on the defective unit. In this manner, the operating equipment will be subjected to minimum down time.

a. OVERALL TROUBLE SHOOTING.

WARNING

Voltages dangerous to life exist in the teletypewriter set. Use extreme caution when servicing this equipment.

(1) GENERAL. - The teletypewriter sets considered in this section have been grouped as follows: Equipment Already In Use; Equipment of Unknown Condition; and Newly Installed Equipment.

(a) EQUIPMENT ALREADY IN USE. - Equipment already in use comprises equipment that has previously performed satisfactorily and is now malfunctioning. Refer to Table 5-10 for preliminary checks and trouble-shooting instructions.

TABLE 5-10. PRELIMINARY CHECKS FOR EQUIPMENT ALREADY IN USE

STEP NO.	ACTION	PROCEDURE OR REFERENCE
1	Check for presence of primary power.	Remove service cable from primary power source; using Multimeter AN/PSM-4, check power source for correct primary power.
2	Check for presence of fuses; using Multimeter AN/PSM-4, check fuses for continuity.	Refer to Figure 2-1; replace defective fuses.
3	Check that option switching arrangement for operating mode being used is correct.	Refer to Paragraph 2-9.
4	Ensure that motor and selector cable connectors are secure in their chassis receptacles.	Tighten or repair loose or damaged connections.
5	Check keyboard and electrical chassis slip contacts for continuity and correct operation.	Tighten loose connections.

TABLE 5-10. PRELIMINARY CHECKS FOR EQUIPMENT ALREADY IN USE (Cont)

STEP NO.	ACTION	PROCEDURE OR REFERENCE
6	Check signal line current. (externally supplied)	Using Multimeter AN/PSM-4, check incoming signal line current: On Line, High Range 20 to 80 ma On Line, Low Range 2.5 to 10 ma
7	Check signal line distortion.	Check for minimum of 70 points of range, using range dial. Refer to Section 4 for a description of the types of distortion which may be encountered.
8	Proceed to Table 5-11 for trouble shooting procedures.	

(b) EQUIPMENT OF UNKNOWN CONDITION. - Equipment of unknown condition is not usable due to an undetermined fault. Refer to Table 5-11 for the trouble shooting procedure.

(c) NEWLY INSTALLED EQUIPMENT. - Newly installed equipment comprises equipment which has been installed but never operated. Perform all tests and adjustments in Section 2 and then proceed with the trouble shooting procedure in Table 5-12.

(2) TEST SETUP AND PRELIMINARY CHECKS. - Operate the machine by hand through any single operation. Check for broken or binding parts. If trouble is not apparent, proceed as follows:

Step 1. Switch the equipment for off-line local mode (Paragraph 2-9).

CAUTION

DO NOT CONNECT THE EQUIPMENT TO THE PRIMARY POWER SOURCE WITHOUT FIRST DETERMINING THAT THE TELETYPEWRITER SET IS COMPATIBLE WITH THE POWER SOURCE. REFER TO PARAGRAPH 2-6 FOR VERIFICATION INSTRUCTIONS.

Step 2. Connect signal and primary power cables to the electrical chassis receptacles.

Step 3. Set the SEND.REC/REC switch to the SEND.REC position.

Step 4. Set MOTOR and LAMP switches to ON position. Observe that copy lamps glow and motor runs; if either or both fail to energize, refer to Table 5-11 for trouble shooting instructions.

Step 5. Set the SEND.REC-REC switch to the REC position. If the machine runs open, trouble is in the keyboard. Deenergize the equipment, remove the keyboard and trouble shoot keyboard. (Refer to Table 5-13.)

Step 6. Disconnect the motor connector and depress the line shorting contacts while observing the motion of the armatures on the magnetic selector. If the armatures do not move, check for any mechanical blocking or binding. If there are no mechanical defects, the trouble is electrical; refer to Table 5-11 for further instructions.

A trouble shooting flow chart, Figure 5-11, is provided for quickly isolating troubles in a systematic manner. Choose one of the symptoms in the top row and follow the indicated procedure. If trouble persists, refer to Table 5-11 for further procedures.

(3) SYSTEM TROUBLE SHOOTING PROCEDURE.- Table 5-12 provides the trouble shooting procedure for isolating the particular functional section (send, receive, or power supply and distribution) at fault. Refer to Figure 5-12 for the primary power distribution diagram. Refer to Section 5 for overall wiring, schematic, and block diagrams; for removal, disassembly, adjustment, or reassembly procedures; and for parts location information.

TABLE 5-11. PRELIMINARY CHECKS FOR EQUIPMENT OF UNKNOWN CONDITION

STEP NO.	ACTION	PROCEDURE OR REFERENCE
1	Perform thorough visual inspection; check for missing or damaged components and security of all connectors. Check belt and cables for wear and proper threading.	Refer to Section 1 for general overall illustrations of the complete equipment. Refer to Section 5 for belt and cable threading instructions.
2	Determine the type of primary power required and connect the teletypewriter set to the applicable primary power source.	Refer to Paragraph 2-8b.
3	Perform all checks of Table 5-10.	

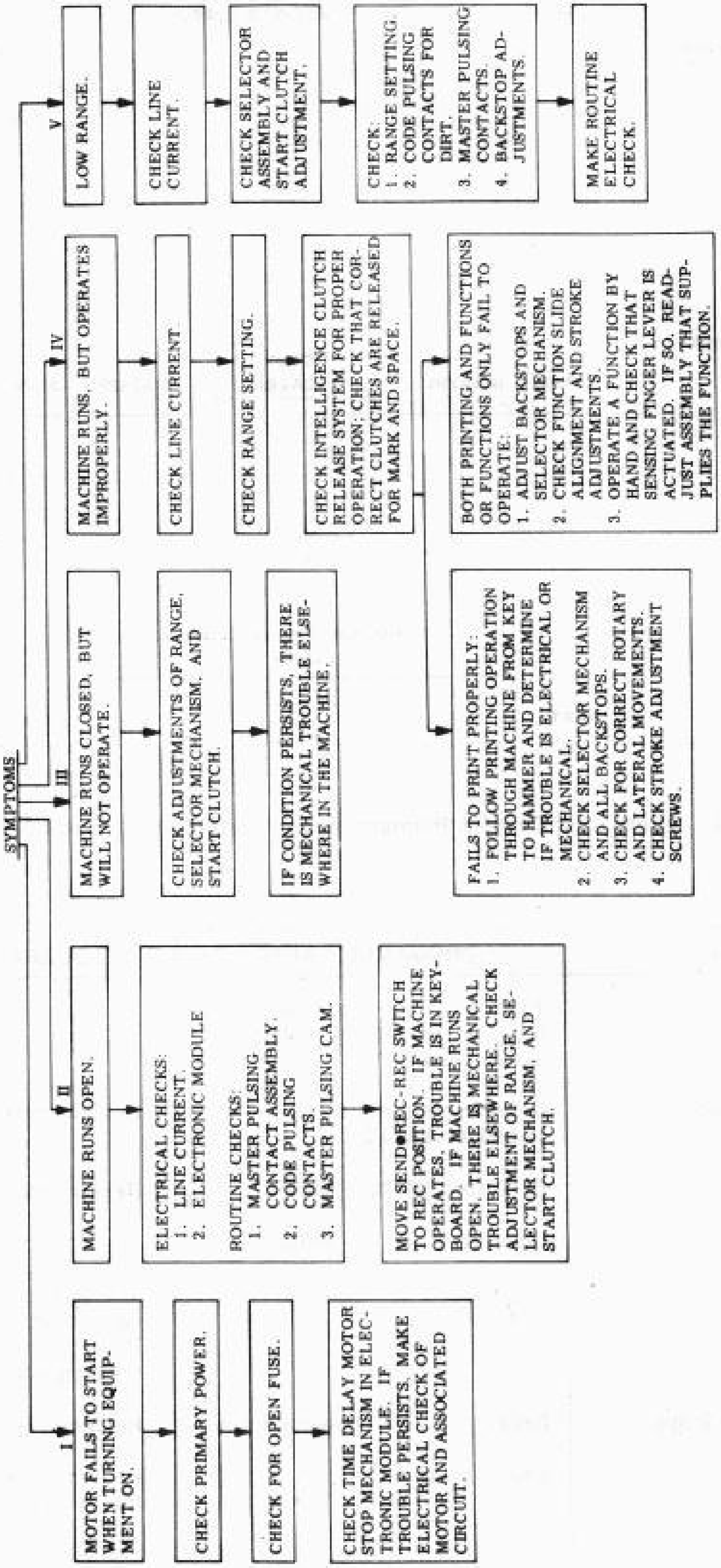

SYMPTOMS
I
MOTOR FAILS TO START WHEN TURNING EQUIPMENT ON.
CHECK PRIMARY POWER.
CHECK FOR OPEN FUSE.
CHECK TIME DELAY MOTOR STOP MECHANISM IN ELECTRONIC MODULE. IF TROUBLE PERSISTS, MAKE ELECTRICAL CHECK OF MOTOR AND ASSOCIATED CIRCUIT.
II
MACHINE RUNS OPEN.
ELECTRICAL CHECKS: 1. LINE CURRENT. 2. ELECTRONIC MODULE
ROUTINE CHECKS: 1. MASTER PULSING CONTACT ASSEMBLY. 2. CODE PULSING CONTACTS. 3. MASTER PULSING CAM.
MOVE SEND-REC-REC SWITCH TO REC POSITION. IF MACHINE OPERATES, TROUBLE IS IN KEYBOARD. IF MACHINE RUNS OPEN, THERE IS MECHANICAL TROUBLE ELSEWHERE. CHECK ADJUSTMENT OF RANGE, SELECTOR MECHANISM, AND START CLUTCH.
III
MACHINE RUNS CLOSED, BUT WILL NOT OPERATE.
CHECK ADJUSTMENTS OF RANGE, SELECTOR MECHANISM, AND START CLUTCH.
IF CONDITION PERSISTS, THERE IS MECHANICAL TROUBLE ELSEWHERE IN THE MACHINE.
IV
MACHINE RUNS, BUT OPERATES IMPROPERLY.
CHECK LINE CURRENT.
CHECK RANGE SETTING.
CHECK INTELLIGENCE CLUTCH RELEASE SYSTEM FOR PROPER OPERATION; CHECK THAT CORRECT CLUTCHES ARE RELEASED FOR MARK AND SPACE.
FAILS TO PRINT PROPERLY: 1. FOLLOW PRINTING OPERATION THROUGH MACHINE FROM KEY TO HAMMER AND DETERMINE IF TROUBLE IS ELECTRICAL OR MECHANICAL. 2. CHECK SELECTOR MECHANISM AND ALL BACKSTOPS. 3. CHECK FOR CORRECT ROTARY AND LATERAL MOVEMENTS. 4. CHECK STROKE ADJUSTMENT SCREWS.
BOTH PRINTING AND FUNCTIONS OR FUNCTIONS ONLY FAIL TO OPERATE: 1. ADJUST BACKSTOPS AND SELECTOR MECHANISM. 2. CHECK FUNCTION SLIDE ALIGNMENT AND STROKE ADJUSTMENTS. 3. OPERATE A FUNCTION BY HAND AND CHECK THAT SENSING FINGER LEVER IS ACTUATED. IF SO, READJUST ASSEMBLY THAT SUPPLIES THE FUNCTION.
V
LOW RANGE.
CHECK LINE CURRENT.
CHECK SELECTOR ASSEMBLY AND START CLUTCH ADJUSTMENT.
CHECK: 1. RANGE SETTING. 2. CODE PULSING CONTACTS FOR DIRT. 3. MASTER PULSING CONTACTS. 4. BACKSTOP ADJUSTMENTS.
MAKE ROUTINE ELECTRICAL CHECK.

Figure 5-11. Trouble Shooting Flow Chart

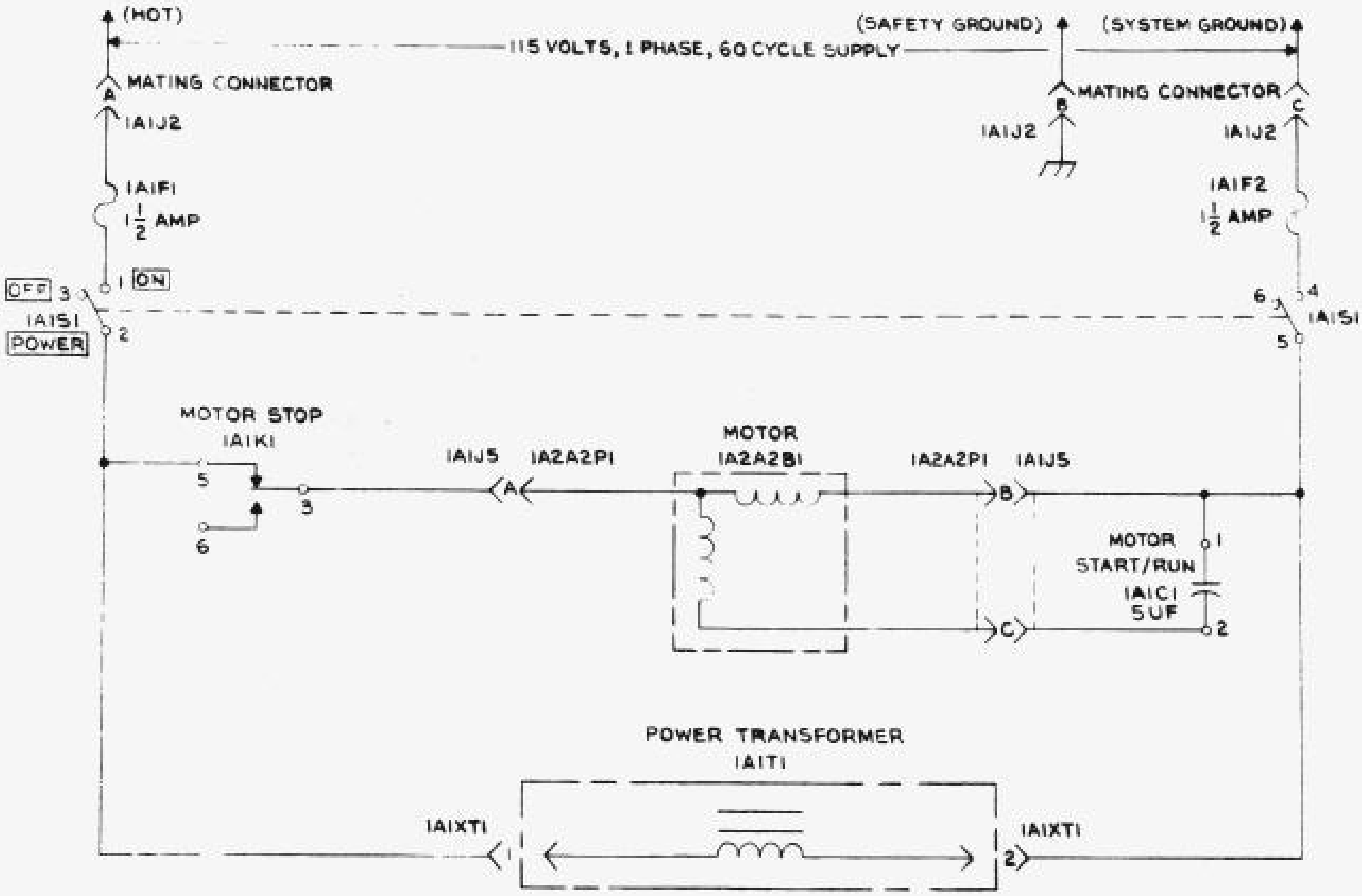


Figure 5-12. Alternating Current Primary Power Distribution, Simplified Diagram

TABLE 5-12. SYSTEM TROUBLE SHOOTING CHART

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
	Prior to using this chart, perform the test setup of Paragraph 5-4a(2)	
1. Both motor and copy lights inoperative	Defective main fuse, 1A1F1 or 1A1F2	Replace fuse or fuses.
	Defective MOTOR switch	Replace switch.
	Open or shorted wire(s)	Perform continuity check using Figure 5-12 and Multimeter AN/PSM-4 or equivalent. Replace or solder broken or shorted wire.
2. Motor inoperative (copy lights operative)	Broken or bent connector pin	Replace connector assembly.
	Faulty motor	Replace motor. Perform continuity check between power leads and chassis. See Figure 5-2. Replace or solder broken or shorted wire(s).

TABLE 5-12. SYSTEM TROUBLE SHOOTING CHART (Cont)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Motor inoperative; slight movement of gears when MOTOR switch is turned on	Faulty starting capacitator 1A1C1 (one side open or shorted)	Test for shorted or open condition. Replace if defective
	Motor stop relay 1A1K1 continuously energized due to defective time delay motor stop, line sensor, or switch 1A1S5	Repair or replace defective parts; refer to Table 5-14 for line sensor trouble shooting procedures
	Defective motor stop circuit in line sensor	Refer to Table 5-14
3. Copy lights inoperative	Faulty LAMP switch 1A1S2	Replace switch
	Faulty bulb(s)	Replace bulb(s)
	Open wire or connection	Perform continuity checks
	Transformer 1A1T1 defective	Replace transformer
4. Motor will not stop after 60 seconds inactivity (no mark to space transition)	Time delay motor stop defective	Refer to Table 5-14
	Defective MOTOR STOP ENABLE-DISABLE switch	Refer to Table 5-14
	Defective motor stop relay 1A1K1	Replace relay (45, Figure 5-104)
	Defective line sensor in electronic module	Refer to Table 5-14 for line sensor trouble shooting
	Open wire or connection	Perform continuity checks in motor stop circuit
5. Motor speed fluctuates	Input power (voltage or frequency) variations	Check primary power
	Binding component in printer	Check clutches, gears, cams, and linkages for free movement; if necessary lubricate parts according to Table 5-9
6. Printer runs open	Defective line sensor in electronic module	Refer to Table 5-14
	Faulty start clutch or clutch release finger adjustment	Adjust according to Paragraph 5-5e(5)
	No mark signal being transmitted	Check for signal line current and/or remote operator
	Signal loop open	Rotary mode switch not correctly positioned for operating mode. Position correctly as instructed in Paragraph 2-9

TABLE 5-12. SYSTEM TROUBLE SHOOTING CHART (Cont)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
	Faulty contact on contact block 1A1E8	Replace contact block
	Defective line sensor in electronic module	Refer to Table 5-14
	Open wire(s)	Perform continuity check on signal line
	Open signal line in service cable	Perform continuity checks on service cable
7. Printer runs closed but does not print	Printer improperly switched for mode of operation	Refer to mode switching instructions in Paragraph 2-9
	Poor solder connections on patch cords	Resolder patch cords
	Defective line sensor in electronic module	Refer to Table 5-14
	Start clutch not releasing	Adjust start clutch as instructed in Paragraph 5-5e(5)
	Selector improperly adjusted or faulty	Adjust selector as instructed in Paragraph 5-5e(17) or replace selector
8. Teletypewriter set prints garbled message	Range dial out of adjustment	Adjust as instructed in Paragraph 2-8e(2)
	Incorrect speed gear installed	Install correct speed gear as instructed in Paragraph 2-11
	Line current at improper value or distorted	Readjust; trace source of distortion
	Selector improperly adjusted	Adjust selector as instructed in Paragraph 5-5e(17)
	Defective line sensor in electronic module	Refer to Table 5-14
	Start clutch improperly adjusted	Adjust as instructed in Paragraph 5-5e(5)
	Loose selector bar (5, Figure 5-89, Appendix)	Tighten selector bar screws
	Defective clutch	Check all clutches for operation by sending RYRY (all clutches should release) Replace defective clutch
	Timing marks on timing cam shaft gear and start clutch gear (Figure 4-11)	Align three dots on start clutch gear with two dots on timing cam shaft gear (˙.˙.˙). Refer to reassembly procedure Paragraph 5-5ab

TABLE 5-12. SYSTEM TROUBLE SHOOTING CHART (Cont)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
	Dirty print cylinder shaft	Clean print cylinder shaft
	Function slides out of adjustment and random functions are selected	Perform function slide and stroke adjustments (Paragraph 5-5e(3)b, 5-5e(4)b, 5-5(18)a and b
	Rotary spring broken	Replace spring (Figure 5-33)
9. Depressing any key does not produce output signal	SEND.REC-REC switch in REC position	Place switch in SEND.REC position
	Printer not seated correctly on electrical chassis	Position printer correctly
	Master pulsing contacts out of adjustment	Readjust on local mode (Paragraph 5-5e(24)(j)
	Keyboard slip connector contactor-contact 1A9E1 defective	Repair or replace contact
	Keyboard not in right operating position	Pull keyboard out to correct position
	Keyboard clutch release finger does not clear tab (Figure 4-5)	Adjust according to Paragraph 5-5e(24)b
	Keyboard drive gear stripped	Replace gear
	Incorrect rotary mode switch position	Set rotary mode switch to position for mode of operation desired
	Defective keyboard	Refer to Table 5-12
10. Printer prints copy received from remote station but not from local keyboard	SEND.REC-REC switch 1A4S3 defective or in REC position	Replace switch or set to SEND.REC position
	Keyboard filter 1A4FL1 open or shorted	Replace filter
	Incorrect mode switch position	Switch to off line operation in order to print (Paragraph 2-9)
	Open wire of connection	Perform continuity check
	Contact block 1A1E8 (AN/UGC-41, only)	Replace contact block
	Keyboard clutch not engaged	Engage clutch
	Master pulsing contacts out of adjustment	Readjust contacts (Paragraph 5-5e(24)(j)

TABLE 5-12. SYSTEM TROUBLE SHOOTING CHART (Cont)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
11. No printing; selection taking place	Print and function clutch not operating correctly	Check clutch for correct operation; repair or replace if necessary
	Print prevent adjustment incorrect	Adjust according to Paragraph 5-5e(19)
	Print hammer actuating adjustment incorrect	Adjust according to Paragraph 5-5e(15 and 16)
	Defective print hammer actuator link helical spring (32, Figure 5-95, Appendix)	Replace spring
	Defective print helical spring (18, Figure 5-92, Appendix)	Replace spring
	Defective print cam follower (35, Figure 5-93, Appendix)	Adjust, repair or replace
12. No function selection; printing taking place	Broken function lever lifter arm screw or function cam follower screw (54 and 85, Figure 5-97, Appendix)	Drill out broken portion and replace with stainless steel screw
	Function bar is not set high enough to clear sensing finger levers on high side of function cam	Adjust function lever lifter arm or entire function section (Paragraph 5-5e(b)(c)
13. Printing on function	Print prevent adjustment screws improperly adjusted (45, Figure 5-99, Appendix)	Adjust according to Paragraph 5-5e(19)
	Print prevent rod lever worn (48, Figure 5-99, Appendix)	Replace with stellite-tipped part
	Print prevent arm worn or out of adjustment (34, Figure 5-93, Appendix)	Adjust arm or replace if defective (Paragraph 5-5e(19)
	Defective print prevent rod actuator arm bias spring (38, Figure 5-99, Appendix)	Replace spring
	Incorrect stroke adjustment	Adjust according to Paragraph 5-5e(18)
14. Printing on space	Function slides out of adjustment (59, Figure 5-99, Appendix)	Adjust according to Paragraphs 5-5e(3)(b) and 5-5e(4)(b)
	Function bar out of adjustment (83, Figure 5-97, Appendix)	Adjust according to Paragraph 5-5e(6)(b)
	Broken function backstop clutch release arm return helical spring (12, Figure 5-99, Appendix)	Replace spring
	Space print prevent adjustment screw incorrectly adjusted (45, Figure 5-99, Appendix)	Adjust according to Paragraph 5-5e(19)

TABLE 5-12. SYSTEM TROUBLE SHOOTING CHART (Cont)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
15. Functions during printing	Function bar adjustment incorrect	Adjust according to Paragraph 5-5e(6)(b)
	Function slides out of adjustment	Adjust according to Paragraphs 5-5e(3)(b) and 5-5e(4)(b)
16. Occasional misprint	Range dial out of adjustment	Adjust according to Paragraph 2-8d(2)
	Signal line distortion	Check for maximum of 30 per cent distortion.
	Defective rotary detent pawl (49, Figure 5-97, Appendix)	Repair or replace pawl
	One or more type positioning clutches not functioning correctly	Check for correct
	Start clutch release adjustment incorrect	Adjust according to Paragraph 5-5e(5)
	Selector adjustment incorrect	Adjust according to Paragraph 5-5e(17)
	Selector armatures binding on pole pieces (Figure 5-89, Appendix)	Check and remove cause of binding.
	Incorrect externally supplied signal line current	Using Multimeter AN/PSM-4, check for 60 ma on high range or 5 ma on low range.
	Defective electronic module	Refer to Table 5-14
	Dirty print cylinder shaft (Figure 5-95, Appendix)	Clean shaft
	Defective clutch release finger	Repair or replace finger
17. Printing too lightly	Defective or twisted ribbon	If defective, replace ribbon according to Paragraph 3-3e(2). If twisting or folding correct by repositioning the ribbon guides to follow the ribbon action.
	Print hammer face pad damaged (20, Figure 5-95, Appendix)	Replace pad
18. Uneven spacing between characters	Dirty print cylinder shaft (17, Figure 5-95, Appendix)	Clean shaft
	Incorrect stroke adjustment	Adjust according to Paragraph 5-5e(18)(a) and (b)
	Loose frame clamps (1, 2, and 9, Figure 5-83, Appendix) (1, 4, and 9, Figure 5-84, Appendix)	Tighten all loose frame clamps

TABLE 5-12. SYSTEM TROUBLE SHOOTING CHART (Cont)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
19. Print hammer hitting only half of character	Function slides out of adjustment	Adjust according to Paragraphs 5-5e(3)(b) and 5-5e(4)(b)
	Print hammer and print cylinder out of alignment	Adjust according to Paragraph 5-5e(14)
	Cables and belt not running on their pulleys	Check that cables and belt are installed as shown in Figure 4-13
20. Printing only top or bottom of characters	Rotary function slide out of adjustment	Adjust according to Paragraph 5-5e(3)(b)
	Rotary adjustment incorrect	Perform all rotary adjustments in Paragraph 5-5e(3)
	Clearance between rotary detent pawl pin and index wheel incorrect (Figure 5-44)	Adjust according to Paragraph 5-5e(7)
	Broken rotary detent pawl spring on detent arm (56, Figure 5-97, Appendix)	Replace spring
	Print cylinder shaft binding	Check and remove cause of binding
	Defective print hammer face pad	Replace pad
21. No carriage advance	Check pawl out of adjustment	Adjust according to Paragraph 5-5e(8)
	Carriage return lock lever not dropping out of carriage return cam follower	Adjust according to Paragraph 5-5e(9)(a)
	Random advance prevention function selected	Adjust function slides according to Paragraphs 5-5e(3)(b) and 5-5e(4)(b)
	Broken or damaged character advance pawl or check pawl springs (35 and 57, Figure 5-97, Appendix)	Check springs and replace defective units
	Character advance pawl, check pawl, or advance ratchet worn (32, 60, and 8, Figure 5-97, Appendix)	Check for wear and replace if necessary
22. No line feed	Refer to first two entries of Symptom 15	Refer to Symptom 15
	Line feed actuator cam follower arm out of adjustment (44, Figure 5-91, Appendix)	Readjust according to Paragraph 5-5e(13)
	Paper pressure release lever in RELEASE position	Move lever to forward LOCK position
	Paper supply roll not rotating freely on electrical chassis	Check installation of paper supply roll and tension on dancer roll tube

TABLE 5-12. SYSTEM TROUBLE SHOOTING CHART (Cont)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
	Function shaft out of adjustment	Adjust according to Paragraph 5-5e(6)(c)
	Pressure roll not clamping paper (12 and 15, Figure 5-96, Appendix)	Check for damaged pressure roll springs or binding pressure roll shaft
	Dirty paper feed rubber roll	Clean roll
	Line feed clutch not operating (9, Figure 5-86, Appendix)	Check for defect and repair or replace
23. No carriage return	Refer to first two entries of Symptom 15	Refer to Symptom 15
	Check pawl does not clear advance ratchet	Adjust according to Paragraph 5-5e(9)
	Carriage return spiral spring broken or disengaged (8, Figure 5-93, Appendix)	Replace or engage spring
24. No blank function	Refer to Symptom 15, and/or check blank print prevent adjustment screw	Refer to Symptom 15
25. No space function	Same as no carriage advance (Symptom 21)	Refer to Symptom 21
	Refer to first two entries of Symptom 15	Refer to Symptom 15
26. No letters function	Figures sensing finger lever stuck in function slide	Release lever
	Letters figures clutch not operating	Check clutch for proper operation
	Incorrect stroke adjustment	Adjust according to Paragraph 5-5e(18)(a) and (b)
	Rotary spring broken (28, Figure 5-95, Appendix)	Replace spring
27. No figures function	Letters sensing finger lever stuck in function slide (Symptom 26)	Refer to Symptom 26
28. No bell function	Refer to first two entries of Symptom 15 and 26	Refer to Symptoms 15 and 26
29. No lateral movement (Refer to Figure 4-13)	Jammed function slides	Release function slides
	Defective lateral tension helical spring	Replace spring
	Cables or belt not functioning	Inspect for fault and correct
30. No rotary movement	Defective rotary spring (28, Figure 5-95, Appendix)	Replace rotary spring
	Defective rotary cable	Replace rotary cable 5-5c(3)

TABLE 5-12. SYSTEM TROUBLE SHOOTING CHART (Cont)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
	Rotary detent pawl adjustment incorrect	Adjust according to Paragraph 5-5e(7)
	Defective clutch	Check clutches for correct operation
31. No automatic carriage return and line feed	Incorrect adjustment	Adjust according to Paragraph 5-5e(9)(b)
32. Automatic carriage return but no line feed	Incorrect alignment of automatic carriage return and line feed sensing finger levers	Adjust automatic carriage return actuator eccentric and actuator arm according to Paragraph 5-5e(9)(b)
33. Carriage return after 4 or 5 characters from left side margin	Incorrect automatic carriage return adjustment	Adjust according to Paragraph 5-5e(9)(b)
	Bounce prevent lever not seating in teeth of V lever assembly	Adjust bounce prevent lever (Paragraph 5-5e(22)) or first character adjustment screw (Paragraph 5-5e(22))
34. Slow carriage return (Refer to Figure 4-19)	Dirty print cylinder shaft	Clean shaft
	Print hammer binding	Clean and remove cause of binding
	Cables may be tight (return cable) or damaged	Loosen or replace cables
	Number of turns on take-up drum insufficient; carriage return spiral eyelet (8, Figure 5-93, Appendix) not engaging tab on carriage return spring mounting cup (10)	Detach cables and lateral control belt; turn takeup drum counterclockwise two turns; install cables and belt; bend end of spiral spring to ensure that eyelet engages tab of cup
35. Advancing on advance prevent functions	Incorrect slide adjustment (will be printing and advancing on functions)	Adjust according to Paragraphs 5-5e(3)(b) and 5-5e(4)(b)
	Function advance prevent adjustment screws on advance prevent bail carriage return bar out of adjustment	Adjust according to Paragraph 5-5e(21)
36. Double line feed every time	Shift linkage on line feed (35, Figure 5-98, Appendix) not functioning	Locate and correct malfunction
	Carriage return too slow	Check for dirt on shafts
	Line feed adjustment incorrect	Adjust according to Paragraph 5-5e(13); make certain that the reference tooth (not the first tooth) on the line feed pawl is used when making this adjustment
	Cable adjustments incorrect	Adjust according to Paragraph 5-5e(3)(c)

TABLE 5-12. TROUBLE SHOOTING CHART (Cont)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
	Incorrect number of turns on carriage return spiral spring (8, Figure 5-93, Appendix)	Takeup drum (carriage return spiral spring) should be loaded two or three turns counterclockwise prior to cable and belt replacement
37. No ribbon reversal	No eyelets in ribbon	Replace ribbon, or tie knots in ribbon on either end, Paragraph 3-3c(2)
	Ribbon improperly threaded	Install ribbon according to Paragraph 3-3c(2)
38. Unusual noise	Clutch backstops out of adjustment	Adjust backstops according to Paragraph 5-5e(1)
	Interference between motor fan and outlet duct assembly	Reposition motor to eliminate interference
	Binding component	Locate and correct
	Incorrect idler gear adjustment	Refer to Paragraph 2-11.
	Defective clutch backstop spring	Replace spring
	Gears require lubrication	Refer to Table 5-9
	Defective gear	Check all gears for damage; replace defective gears.
	Defective bearings on gears	Check and replace defective bearings
39. Teletypewriter Set is polarity sensitive	Defective bridge diode in line sensor in electronic module	Refer to Table 5-14, for line sensor trouble shooting
40. Continuous line feed	Automatic carriage return mechanism is jammed	Lift up printer, free line feed on carriage return mechanism and check springs
41. No automatic line feed on carriage return	Latch assembly not positioning under carriage return arm eccentric not adjusted properly	Readjust the line feed on carriage return mechanism and check springs. Refer to Paragraph 5-5e(10)
42. Occasional line feed on carriage return	Same as Symptom 41	Same as Symptom 41
43. Line feed is supplied when off-line carriage return control is actuated	Adjustable slide is not pivoting the cancellation lever and latch assembly out of the way of carriage return arm	Readjust the adjustable slide. Refer to Paragraph 5-5e(10)
44. No automatic line feed on carriage return	Jammed assembly, assembly spring hooked to disable post, or defective spring	Free assembly, reposition and/or replace spring

TABLE 5-12. SYSTEM TROUBLE SHOOTING CHART (Cont)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
45. Keyboard does not operate properly, when pulse is being received	Faulty interlock adjustment	Readjust. Refer to Paragraph 5-5e(24)(b)
	Solenoid dirty or defective	Clean or replace
	Solenoid release pin does not clear clutch release lever when solenoid is actuated. Words per minute is not synchronized with pulse rate.	Check leaf spring adjustment
	Insufficient pulse strength	Check pulse current. Pins G and H.
46. Keyboard does not operate	No synchronous pulse received	Check for pulse at pins G and H. Notify pulse source.
47. Keyboard interlock mechanism sticks in disable position	Defective or dirty solenoid	Clean and/or replace solenoid assembly
	Keyboard interlock mechanism incorrectly adjusted	Perform adjustment sequence. Refer to 5-5e(24)(b)
	Interlock disabled by interlock stop arm	Move stop arm to correct position. Refer to Paragraph 5-5e(24)(c)
	Release pin jammed	Check release pin and its seat for burrs or other foreign matter. Clean and/or replace as necessary. Refer to Figure 5-73.
47. Copy lights operate in "ON" position. No copy lights in "DIM" position.	R1 defective	Replace. Refer to Figure 5-107 or 5-114
	Copy light switch (S2) defective	Replace

b. FUNCTIONAL SECTION TROUBLE SHOOTING.- The teletypewriter sets consist of three functional sections; send, receive, and power supply and distribution.

(1) PRELIMINARY PROCEDURES.

Step 1. Perform any applicable preliminary checks in Table 5-9.

Step 2. Refer to Paragraph 5-5 for any required removal, disassembly, adjustment, or reassembly procedures and for parts location information.

(2) TEST SET-UP.

Step 1. Position rotary mode switch for off-line local mode (Paragraph 2-9).

Step 2. Connect signal and primary power cables to the electrical chassis receptacles (Paragraph 2-8b).

Step 3. Set the SEND.REC/REC switch to the SEND.REC position.

Step 4. Set the MOTOR switch to the ON position.

(3) TEST POINTS. - Test points for use in signal tracing and voltage and continuity tests are shown on the trouble-shooting tables and illustrations. The test points are divided into three categories: major, secondary, and minor.

Major test points for isolating the cause of a malfunction to a functional section are identified by an encircled Arabic number enclosed in a star; for example, major test point 1 is shown as

☆①

Secondary test points for isolating the cause of a malfunction to a specific circuit are identified by an encircled capital letter; for example, secondary test point A is shown as

Ⓐ

Minor test points for isolating the cause of a malfunction to a specific part are identified by an encircled capital letter and a subscript Arabic numeral; for example, minor test point A_1 is shown as

(A_1)

(4) KEYBOARD 1A4, TROUBLE SHOOTING. (Refer to Table 5-13.)

(5) ELECTRONIC MODULE 1A3, TROUBLE SHOOTING. (Refer to Table 5-14.)

(6) PRINTER 1A2, TROUBLE SHOOTING. (Refer to Table 5-15.)

(7) ELECTRICAL CHASSIS 1A1, TROUBLE SHOOTING. (Refer to Table 5-16.)

(8) TRANSMITTER CONTROL CIRCUITRY TROUBLE SHOOTING. (Refer to Table 5-17.)

TABLE 5-13. KEYBOARD 1A4, TROUBLE SHOOTING CHART

TEST POINT	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Figure 5-13			
A	1. Teletypewriter set runs open	Keyboard slip connector or contact block not making correct contact	Check for defective contacts; repair or replace defective contacts
A_1 A_2 A_3		Defective filter FL1; defective code pulsing contacts; defective master pulsing contacts; or defective BREAK switch	Remove keyboard; connect multimeter across A; if reading is not 5 ohms, connect multimeter across A_1 and then across A_2. If either reading is not 2.5 ohms, replace filter FL1. If readings at A_1 and A_2 are both 2.5 ohms, connect multimeter across A_3. If no continuity is obtained across A_3, replace BREAK switch. Adjust or repair code pulsing or master pulsing contacts for reading of 5 ohms across A.
NONE	2. Teletypewriter set runs closed with keyboard in operating position	SEND.REC-REC switch in wrong position or defective	Set SEND.REC-REC switch in correct position or replace switch
		Master pulsing contacts or code pulsing contacts defective or out of adjustment	Adjust according to paragraph 5-5e(24)(j) or replace contacts
		Defective pulsing finger	Replace pulsing finger
		Defective filter FL1	Refer to Symptom 1 for procedure
NONE	3. Incorrectly transmitted character	Incorrect range adjustment	Adjust according to paragraph 2-8e(1)
		Master pulsing contacts defective or out of adjustment	Adjust according to paragraphs 5-5e(24)(j) and 5-5e(26)(b) or replace contacts
NONE	4. Depressing BREAK switch does not open signal line	Defective BREAK switch	Refer to Symptom 1 for procedure

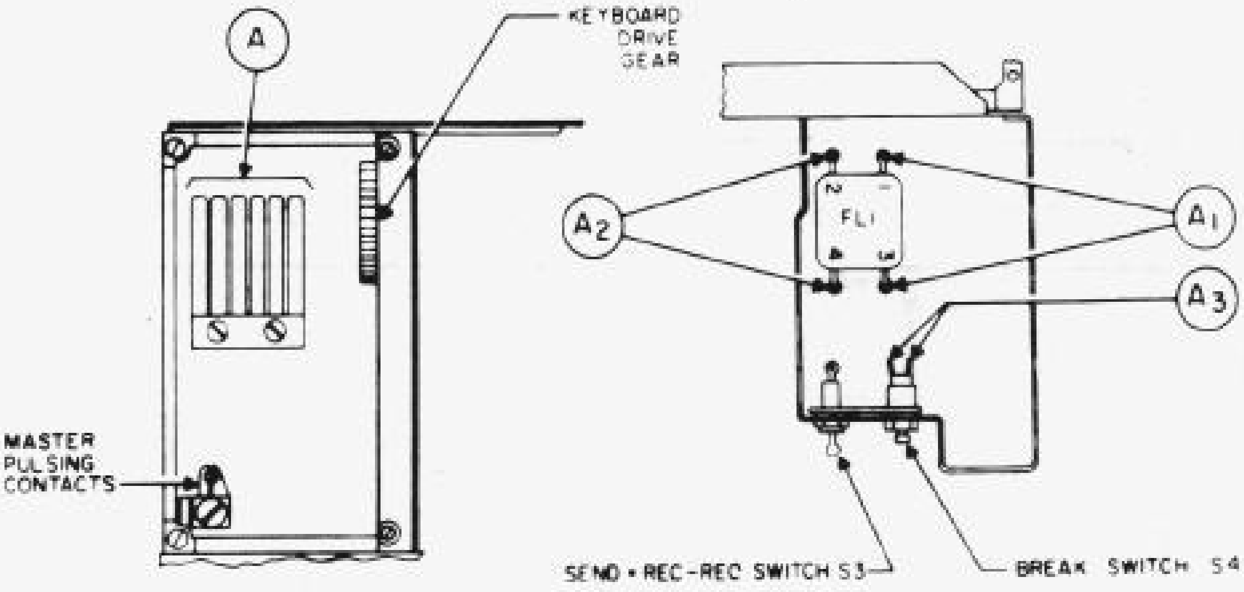


Figure 5-13. Keyboard 1A4, Location of Test Points

TABLE 5-14. ELECTRONIC MODULE 1A3, TROUBLE SHOOTING CHART

Conditions for testing electronic module:

Step 1. Place rotary mode switch 1A1S3 in OFF LINE position.
Step 2. Turn main power switch 1A1S1 to ON position.

NOTE

All readings are taken between TP3 (reference 0 vdc) and the test points shown in this chart except when otherwise indicated.

TEST POINTS	VOLTAGES (Nominal Values)		EXPLANATION
Figure 5-14	MARK CONDITION	SPACE CONDITION	
TP1 to TP2	CAUTION LINE BATTERY IS PRESENT ON TP1 AND TP2 IN THE OFF LINE MODE OF OPERATION.		Can be used for check of externally supplied signal line voltage only. Insert probe inside sleeve tubing to obtain multimeter reading.
Cathode of VR1	+11.2	0 vdc	Signal input to A3.
TP3	0 vdc Reference	0 vdc Reference	0 vdc line of power supply.
TP4	11.2 vdc	13.12 vdc	Output of A2 (TP4 is positive with respect to TP3).
TP5	-	-	Not used.
TP6	-	-	Not used.
TP7	6.9 vdc	1.044 vdc	Output of A3 to mark and space coils of selector.
TP8	.424 vdc	8.02 vdc	Output of A3 to mark and space coils of selector.
TP9	11.2 vdc (Before motor stop relay energizes) 4.03 vdc (After motor stop is energized)	13.12 vdc In space condition motor stop relay is deenergized	Output of A1.
TP10 to TP11	16.2 vdc	17.2 vdc	Output of Transformer T1, located on electrical chassis.
TP12	-	-	Not used.
TP13	-	-	Not used.
TP B (See Figure 5-14)	6.844 vdc	8.02 vdc	Check to ensure that 1A3R2 is not open.

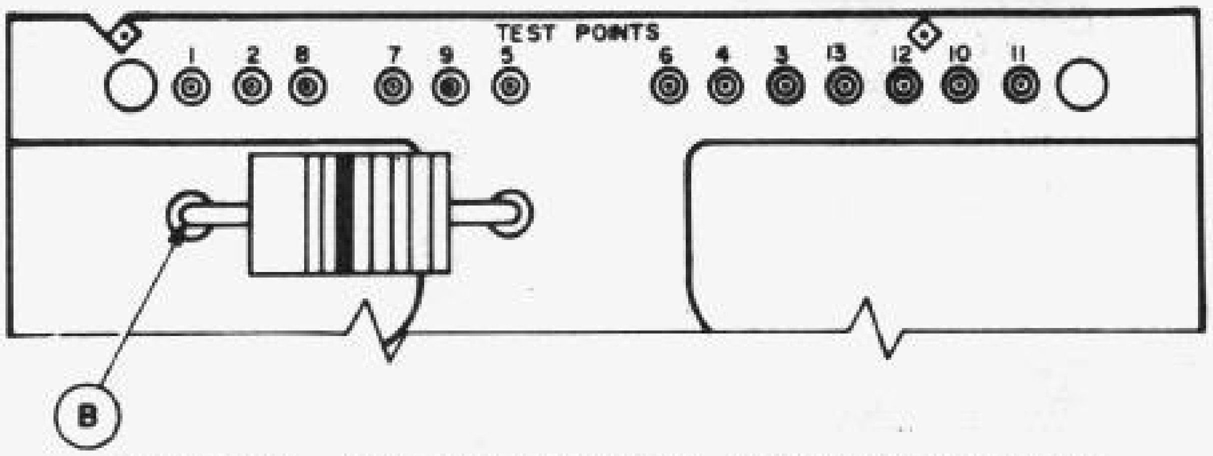


Figure 5-14. Electronic Module 1A3, Location of Test Points

TABLE 5-15. PRINTER 1A2, TROUBLE SHOOTING CHART

TEST POINT	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Figure 5-15			
1	1. Motor does not operate	Absence of input power	Turn equipment off. Gain access to motor. Remove connector from jack 1A1J5 (test point #1) and turn equipment on. Connect a-c multimeter between 1AJ5-A and 1AJ5-B and read 115 vac. If reading is incorrect, refer to Table 5 (Appendix). If readings are correct, continue with Symptom 2.
B	2. Motor does not operate; input power present	Defective motor or faulty connections	Turn equipment off. Connect multimeter (ohms) between A2P1-B and A2P1-A (47 ohms) and between A2P1-B and A2P1-D (140 ohms). If readings are incorrect, check for faulty connections or replace defective motor.
C	3. Printer runs open	Magnetic selector not plugged in or defective	Make certain that magnetic selector connector is secure in jack 1A3J1. If trouble persists, turn equipment off, remove connector, and connect multimeter (ohms) between A1P1-B and A1P1-D; meter should read 65 ohms ± 10%. Check between A1P1-C and A1P1-D for same reading. If reading is incorrect, check for broken connection or replace magnetic selector.
	4. Printer runs closed	Same as Symptom 3	Same as Symptom 3.
	5. Motor will not stop with time delay motor function	Defective stop switch 1A2S1	Turn equipment off. Connect multimeter (ohms) between 1A2P1-F and 1A2P1-H; actuate stop switch and check for continuity reading. If no continuity, replace stop switch.
	6. Refer to Table 5-12 for other symptoms of trouble in printer		

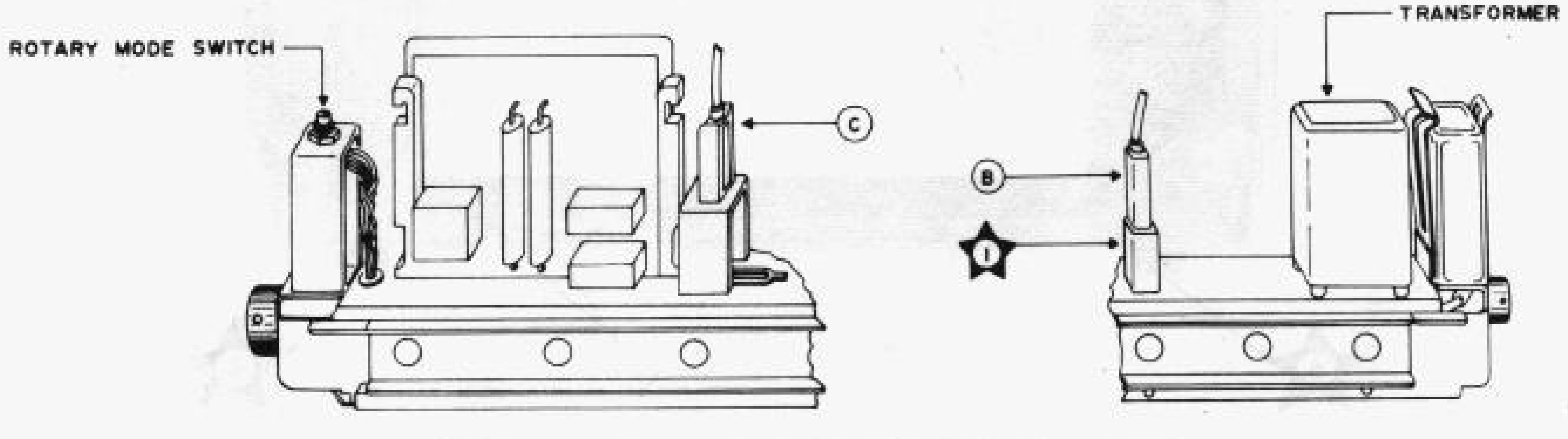


Figure 5-15. Printer 1A2, Location of Test Points

TABLE 5-16. ELECTRICAL CHASSIS 1A1, TROUBLE SHOOTING CHART

TEST POINT	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Figure 5-16			
4	1. Printer motor, line sensor, or line sensor power supply inoperative due to loss of input primary power	Defective parts in primary power circuit	Connect multimeter across #4 connector (pins A and C) and check for 115 vac. Check fuses F1 and F2 and MOTOR switch S1 if readings are incorrect. If components are not defective, check power inputs at #6, #7, and service cable connections.
I	2. Motor will not stop with time delay motor stop function	Defective coil on motor stop relay K1	With power off, connect multimeter (ohms) across I; if meter reads very high resistance (1 megohm or above), replace relay.
J K	3. Printer motor inoperative	Defective capacitor C1	With power off, connect multimeter between J and K; meter should read very high (1 megohm or above) or infinite resistance. If not, replace C1. To check for an open capacitor C1, replace with a known good capacitor. Check F2, and replace if defective.
L		Defective fuse F1 or F2	Replace fuse or fuses
5	4. No keying of send line	Defective keyboard, or incorrect option switching	Refer to table for keyboard trouble shooting. Check for correct option switching (Paragraph 2-9).
	5. Line sensor in electronic module inoperative	Loss of input signal	Check for presence of input signal at #5. If signal is missing, or check for correct option patching (Paragraph 2-9).

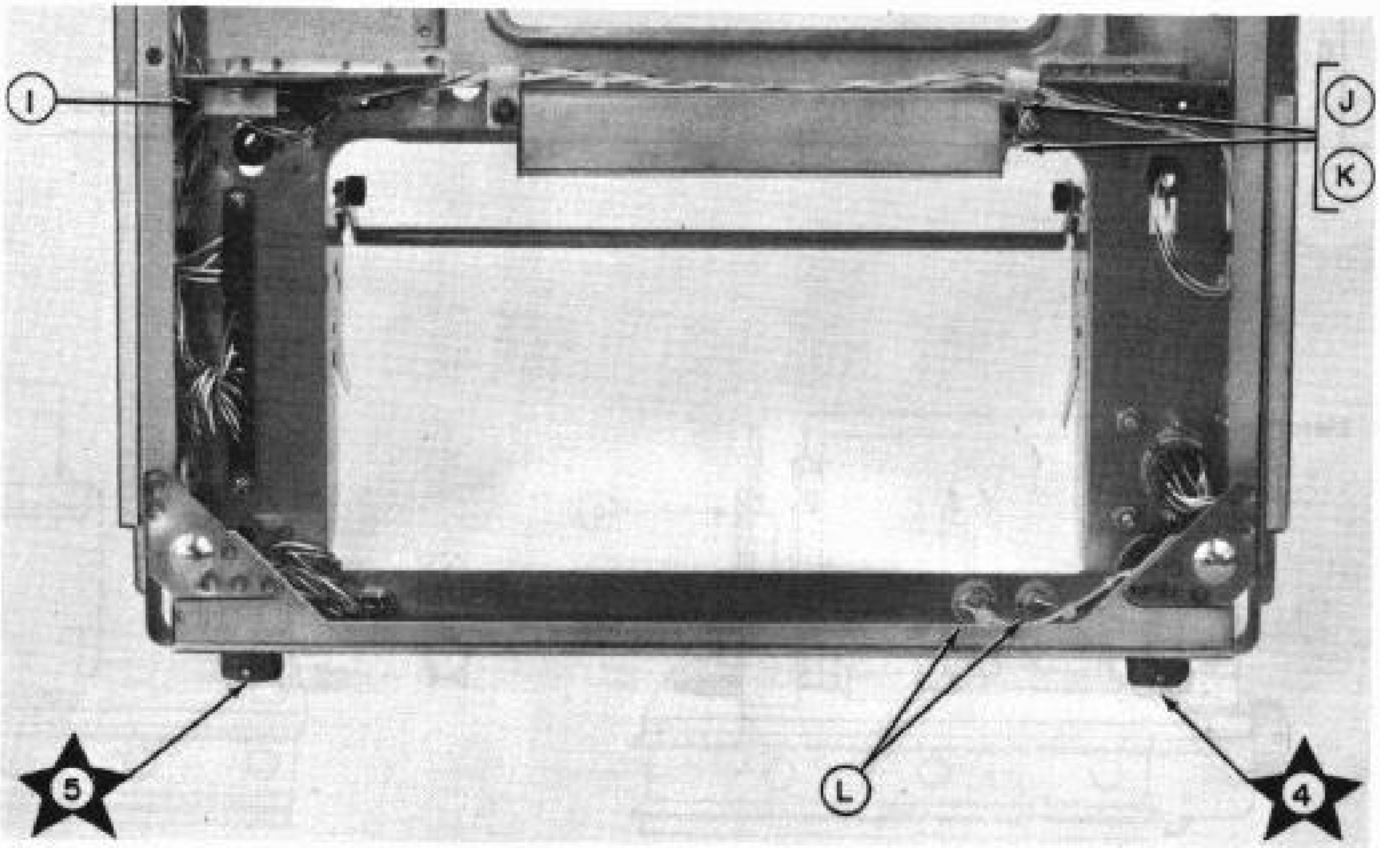


Figure 5-16. Electrical Chassis, Location of Test Points

TABLE 5-17. TRANSMITTER CONTROL CIRCUITRY TROUBLE SHOOTING (AN/UGC-41 only)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
1. Remote Transmitter not being keyed when SEND. REC-REC switch of keyboard set in the SEND. REC position and keyboard in the operating position.	Step 1. Malfunction or faulty wiring between transmitter control chassis terminals and remote transmitter.	Remove external signal connector and short pins E and F of mating connector together. If transmitter does not key, trouble is either loose connection or no source of battery to key relay. If the transmitter keys, go to Step 2.
	Step 2. Faulty wiring between terminals of chassis connector and SEND. REC-REC switch of Teletypewriter Set.	Place SEND. REC-REC switch in SEND. REC position and check for continuity across pins E and F in chassis connector 1A1J1. If continuity is not obtained proceed to Step 3.
	Step 3. Faulty chassis connector 1A1J1.	Set SEND. REC-REC switch in SEND. REC position and check for continuity across pins E and F of chassis 1A1J1. If no reading is obtained check for loose wiring or defective connector. If wiring and connector check out, proceed to Step 4.
	Step 4. Loose wire between contacts 2 and 5 of contact block of chassis and/or E and F of connector 1A1J1.	Remove keyboard from chassis. Check for continuity between pin E of chassis connector and contact 2 of contact block, and pin F of chassis connector and contact 5 of contact block. If continuity is not obtained in either reading, check for loose connection or cold solder joint. If continuity is obtained proceed to Step 5.
	Step 5. Faulty contacts in SEND. REC-REC switch (1A4S3) or loose wire between switch and slip contacts of the keyboard.	Check for continuity across transient contacts 3 and 4 of keyboard with SEND. REC-REC switch in SEND. REC position. If continuity is not obtained, check across terminals of switch. If reading is not obtained, replace the switch. If reading is obtained, check for loose wiring between switch and slip contacts.
	Step 6. Faulty contact blocks.	Set SEND. REC-REC switch in SEND. REC position. Check for continuity across pins E and F of chassis connector 1A1J1. If no reading is obtained check contact block 1A1E8 and keyboard slip connector contacts 1A4E1. Bend keyboard slip connector contacts 3 and 4 slightly upward and recheck for continuity across pins E and F of chassis connector. Replace contact block (1A1E8 if necessary.

5-5. REPAIR

The following paragraphs contain instructions for repairing and adjusting the teletypewriter sets. Parts location illustrations are provided throughout the text or in the Appendix as required. Overall schematic and wiring diagrams are provided in the Appendix.

a. FAILURE REPORTS. - Failure reports are not required. (See Paragraph 5-1, NAVSHIPS Handbook 94500).

b. REMOVAL AND INSTALLATION PROCEDURES. - The following procedures establish the manner in which the teletypewriter sets are to be dismantled to their component levels for adjustment or further disassembly. Specific disassembly and assembly instructions are contained in Paragraphs 5-5f through 5-5g.

(1) CABLE REMOVAL. - Set all switches in the OFF position, turn the connector plug one quarter turn counterclockwise and pull straight out.

(2) CABLE INSTALLATION

Step 1. Set all switches in the off position.

Step 2. Inspect the cable receptacles in the rear of the electrical chassis to insure that no foreign matter is present.

CAUTION

IF INTERFERENCE OR BINDING IS ENCOUNTERED WHILE PERFORMING THE FOLLOWING STEPS, IMMEDIATELY REMOVE THE CONNECTOR-PLUG FROM THE RECEPTACLE AND DETERMINE THE CAUSE OF INTERFERENCE.

Step 3. Align the key of the cable connector-plugs with the keyway of the cable receptacles.

Step 4. Carefully insert the cable connector-plugs into the cable receptacles and then turn the connector-plugs a quarter turn clockwise to secure them.

CAUTION

BE SURE THAT THE PRIMARY CABLE IS GROUNDED AT THE PRIMARY POWER SOURCE.

(3) PRINTER FRONT COVER AND ELECTRICAL CHASSIS REMOVAL.

NOTE

Remove the cable connector-plugs (Paragraph 5-5b(1) prior to performing the following steps.

Step 1. Disengage the two captive fasteners on the printer front cover by turning them 1/4 turn counterclockwise.

Step 2. Carefully pull the top of the front cover toward the front of machine (approximately 1/2-inch) and lift up.

CAUTION

WHEN THE FRONT COVER IS REMOVED, THE ELECTRICAL CHASSIS LOCKING DEVICE IS RELEASED AND THE CHASSIS IS FREE TO SLIDE OUT OF THE PRINTER.

Step 3. Slide the chassis out of the case.

CAUTION

CHECK TIGHTNESS OF TWO GROUND STRAPS CONNECTED TO CASE BY SLIDE BRACKETS AND VIBRATION INSULATION ASSEMBLY SCREWS. THIS ASSURES A SAFETY GROUND IF PIN IN PRIMARY POWER CONNECTOR IS DEFECTIVE.

(4) PRINT COVER AND ELECTRICAL CHASSIS INSTALLATION. The printer front cover and electrical chassis are replaced in the case by reversing the removal procedure.

(5) PRINTER REMOVAL FROM ELECTRICAL CHASSIS.

Step 1. Remove the front cover and chassis assembly in accordance with Paragraph 5-5b(3).

Step 2. Disconnect the motor and selector connector-plugs by depressing connector leaf springs.

Step 3. Depress lock pins in cooling housing and slide cooling outlet to the right.

NOTE

This permits access to right lock screw through hole in cooling housing.

Step 4. Disengage the printer slide locks and the two rear lock screws.

Step 5. Lift the printer assembly away from the electrical chassis by lifting up and to the rear to prevent damage to the off-line function slides.

NOTE

Lift printer by range dial (located on left side of printer) and speed change gear locknut (located on right side of printer).

(6) PRINTER INSTALLATION ON ELECTRICAL CHASSIS.

Step 1. Rotate printer front support counterclockwise to loaded (retracted) position.

Step 2. Position the printer on the electrical chassis and engage the two printer slide locks and two printer attaching screws.

Step 3. Depress lock pins and slide cooling outlet to the left until lock pins reengage in cooling outlet holes.

Step 4. Connect the magnetic selector plug to the receptacle provided in the line sensor. Connect the motor plug to the receptacle provided in the line sensor. Connect the motor plug to the receptacle just forward of the signal line power supply.

Step 5. Reinstall the front cover and chassis assembly.

(7) KEYBOARD REMOVAL.

CAUTION

INSURE THAT THE PRINTER MOTOR HAS BEEN TURNED OFF PRIOR TO ATTEMPTING KEYBOARD REMOVAL.

NOTE

The keyboard cannot be removed without first removing the front cover and electrical chassis from case.

Step 1. Remove the front cover and electrical chassis as instructed in Paragraph 5-5b(3).

Step 2. Remove printer from chassis as instructed in Paragraph 5-5b(4).

Step 3. Remove two screws which secure keyboard within the electrical chassis and slide the keyboard forward and out of chassis.

(8) KEYBOARD INSTALLATION. - The keyboard is replaced in the electrical chassis by reversing the steps in the keyboard removal procedure.

(9) ELECTRONIC MODULE REMOVAL FROM ELECTRICAL CHASSIS.

Step 1. Remove the front cover and chassis assembly as instructed in Paragraph 5-5b(3).

Step 2. Pivot spring clip retainer to rear to free printed circuit board (electronic module).

Step 3. Grasp the printed circuit board (electronic module) by its sides and pull upward until it clears guides on both sides.

NOTE

Insulation board should be left in chassis guides.

(10) ELECTRONIC MODULE INSTALLATION IN ELECTRICAL CHASSIS. - Reverse the electronic module removal procedure to replace the electronic module in the electrical chassis.

CAUTION

WHEN INSERTING PRINTED CIRCUIT BOARD (ELECTRONIC MODULE IN ITS RECEPTACLE) IN CHASSIS, BE CAREFUL NOT TO DAMAGE PRINTED CIRCUIT BOARD BY USING EXCESSIVE PRESSURE. BE SURE TO REINSERT INSULATION BOARD IN BACK OF PRINTED CIRCUIT BOARD IF INADVERTENTLY REMOVED.

(11) TRANSFORMER REMOVAL.

Step 1. Remove the front cover and electrical chassis assembly as instructed in Paragraph 5-5b(3).

Step 2. Turn chassis upright and pull the transformer directly upward out of its socket in chassis.

(12) TRANSFORMER INSTALLATION.

Step 1. Align the prongs of transformer with the socket holes in chassis.

Step 2. Insert transformer in its socket in chassis.

Step 3. Reverse Steps 1 through 3 of transformer removal procedure (Paragraph 5-5b(11)) to complete installation of the transformer in the electrical chassis.

c. REPLACEMENT PROCEDURES. - The replacement of cables, lateral belt, advance drum ratchet, and master pulsing contacts described in the paragraphs that follow require only minor disassembly. Adjustments which are effected by a replacement procedure are indicated in the replacement procedure. In most instances all that is required is that a check of the indicated adjustments be made before returning the equipment to service. The replacement of worn or defective mechanical parts requires disassembly of the equipment as far as necessary to gain access to parts. Replace the part with the correct replacement part listed in appropriate Illustrated Parts List.

(1) ELECTRONIC COMPONENT REPLACEMENT.- The replacement of defective electronic components is accomplished using standard hand tools and soldering techniques. Replace all defective electronic parts with the correct replacement part.

CAUTION

BE SURE TO USE AN ADEQUATE HEAT SINK WHEN SOLDERING TRANSISTORS OR OTHER HEAT SENSITIVE COMPONENTS.

(2) TWO PIECE LATERAL CONTROL BELT REPLACEMENT.

Step 1. Place printer in letters "A".

Step 2. Depress carriage return off-line function slide, and rotate mainshaft until carriage return occurs.

Step 3. Loosen lateral control belt clamp on advance drum (Figure 5-17).

Step 4. Remove lateral control belt from under its clamp.

Step 5. Loosen lateral control belt clamp screw on takeup drum.

Step 6. Remove lateral control belt from the takeup drum, the tension pulley, and the lateral pulley (located on the left corner of the printer).

Step 7. Remove print cylinder yoke shaft "E" ring located outside of the printer right frame wall.

Step 8. Slide print cylinder yoke shaft to the left to disengage shaft from hole in right frame wall.

Step 9. Slide print cylinder yoke shaft to the right and remove shaft completely from print cylinder yoke and printer frame.

CAUTION

EXERCISE CARE NOT TO KINK BELT DURING THE INSTALLATION PROCEDURE, AS KINKING WILL FRACTURE THE MATERIAL.

Step 10. Remove both old belts from anchor posts on print cylinder yoke.

Step 11. Staple flat end of new lateral belt to loop end of old belt (belt to the right of print cylinder yoke).

NOTE

When stapling the overlapped ends of the belts together, be sure that there are no twists in the old or new belts.

Step 12. Gradually pull right end of old lateral belt (portion outside of the printer) to the right until new belt comes out of the printer right side.

Step 13. Slide loops of new belts over anchor posts on print cylinder yoke.

Step 14. Slide print cylinder yoke shaft from right to left into print cylinder yoke.

Step 15. Slide print cylinder yoke shaft into hole in left frame wall and then to the right into hole in right frame wall.

Step 16. Insert yoke shaft "E" ring into its notch outside of the right frame wall.

Step 17. Separate the old belt from new fiberglas belt at the point where they are stapled together.

Step 18. Twist the fiberglas belt 1/4 turn clockwise and then pass the belt around the pulley on the right side of the frame just outside the hole in the frame wall.

Step 19. Make a 1/4 clockwise turn in the lateral belt and then one full counterclockwise turn with the belt around the advance drum; then insert the lateral belt through the notch in the advance drum.

Step 20. Place the lateral belt under lateral belt clamp on the advance drum (there should be approximately 2 inches of excess belt).

Step 21. Loop the excess belt, insert belt end under lateral belt clamp and tighten the lateral belt clamp screw.

Step 22. Check to be sure that lateral belt remains under the clamp when the clamp screw is tightened.

Step 23. Thread new left lateral belt around lateral belt pulley on left corner of the printer.

NOTE

It is not necessary to staple the left lateral belt (belt to the left of print cylinder yoke) as threading of belt through left side of printer is easily accessible.

Step 24. Loop lateral belt over the top of lateral belt tension pulley and then under the tension pulley.

NOTE

If the takeup drum spring tension has been released, preload the takeup drum by turning it two or three complete turns counterclockwise. Then insert a hex wrench or similar object into the hole in the takeup drum and the takeup bracket to prevent the takeup drum from unwinding.

Step 25. Make two full clockwise turns (as viewed from the left side of printer) around takeup drum and insert belt through notch in the takeup drum.

Step 26. Pull left end of the lateral belt until the outside diameter of the lateral tension pulley is approximately 1/8 inch away from the outside diameter of the takeup drum.

Step 27. Insert the lateral belt under its clamp on the takeup drum.

Step 28. Loop the excess belt, insert the belt end under the clamp and tighten the lateral belt clamp screw; remove hex wrench inserted in Step 24 (NOTE).

Step 29. Check to be sure that lateral belt remains under the clamp when the clamp screw is tightened.

Step 30. Advance the print cylinder all the way across its shaft by turning the advance drum counterclockwise until two clicks are heard or felt, indicating that the end of the line has been reached.

Step 31. Check for 1/2 inch clearance between the right end of the print cylinder yoke and print cylinder shaft bearing in the printer right frame wall (1/2 inch for 72 character line and 1/16 inch for a 76 character line format).

Step 32. If the clearance is not as specified in Step 31 loosen the lateral belt clamp on the advance drum and let out or takeup as required, until 1/2 or 1/16 inch clearance is established between the print cylinder yoke and print cylinder shaft bearing.

Step 33. Readjust for 1/8 inch clearance as explained in Step 26.

Step 34. Depress the off-line carriage return slide while rotating the mainshaft until carriage return occurs.

Step 35. Advance the print cylinder half-way across its shaft by rotating the advance drum counterclockwise.

Step 36. Loosen the hammer cable clamp screw on advance drum.

Step 37. Loosen hammer cable around hammer bracket lugs and align the hammer to the letter A.

Step 38. Tighten the hammer cable on the hammer bracket lugs when the alignment of the hammer and the letter A is correct.

Step 39. Tighten hammer cable under its clamp on advance drum when hammer face is properly aligned with the letter A.

Step 40. Check to insure that there is no hammer cable overlap on the takeup drum when the printer is in the full carriage return position.

Step 41. Turn the advance drum counterclockwise until the print cylinder has advanced half-way across the line.

Step 42. Depress the carriage return lever and observe return action (movement of the print cylinder to the lefthand margin).

NOTE

Carriage return should be rapid. If carriage return is slow (print cylinder moves slowly or hesitates), proceed with Step 43. If the carriage return is satisfactory the lateral belt adjustment is completed.

Step 43. Loosen the hammer cable slightly until carriage return speed is satisfactory.

NOTE

There must be no cable overlap on the takeup drum upon completion of this adjustment.

Step 44. Check lateral slide alignment Paragraph 5-5e(4)(b).

NOTE

A check of lateral slide alignment is recommended after 24 to 48 hours of operation.

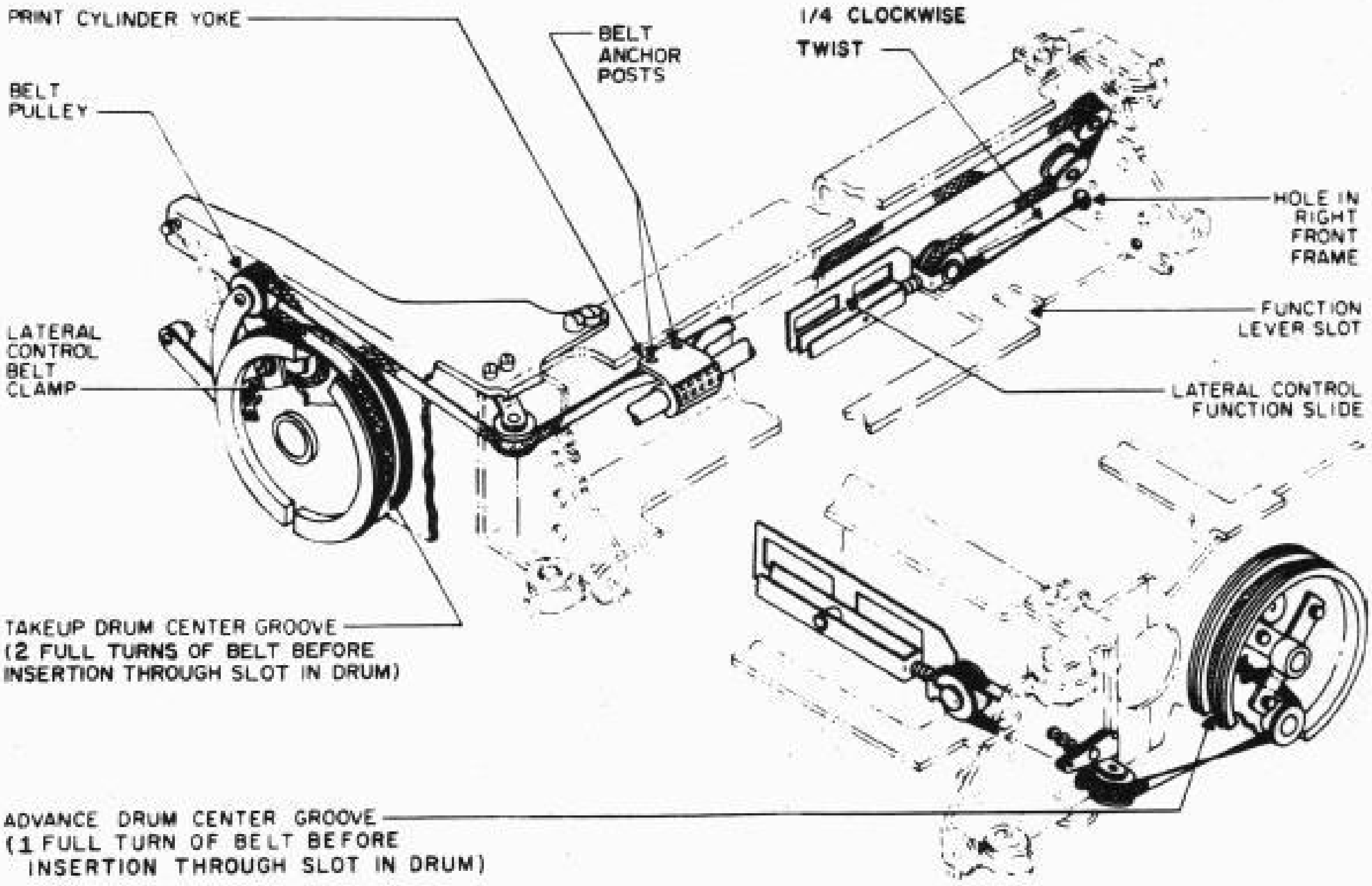

PRINT CYLINDER YOKE
BELT ANCHOR POSTS
1/4 CLOCKWISE TWIST
BELT PULLEY
HOLE IN RIGHT FRONT FRAME
LATERAL CONTROL BELT CLAMP
FUNCTION LEVER SLOT
LATERAL CONTROL FUNCTION SLIDE
TAKEUP DRUM CENTER GROOVE (2 FULL TURNS OF BELT BEFORE INSERTION THROUGH SLOT IN DRUM)
ADVANCE DRUM CENTER GROOVE (1 FULL TURN OF BELT BEFORE INSERTION THROUGH SLOT IN DRUM)

Figure 5-17. Two Piece Lateral Control Belt Replacement, Belt Threading Diagram

(3) ROTARY CABLE REPLACEMENT.

NOTE

Do not remove the old rotary cable as it will be used to thread the new rotary cable through the printer pulley system.

Step 1. Place the printer in letters "A"

CAUTION

IN THE NEXT STEP, RAPID UNWINDING OF THE ROTARY MOTION SPRING WILL SERIOUSLY DAMAGE THE SPRING. IF THE ROTARY MOTION SPRING RETAINER IS RELEASED SUDDENLY, OR THE ROTARY CABLE HAS BROKEN, REMOVE THE GRIP RING AND TWO WASHERS AND INSURE THAT THE SPRING (FIGURE 5-18) HAS NOT BEEN DAMAGED.

Step 2. While holding the rotary motion spring retainer, loosen the print cylinder shaft bearing retainer screws and allow the spring retainer to unwind slowly until the spring tension is released.

Step 3. Place the printer on its backplate and turn the rotary cable adjustment screw (Figure 5-19) until the rotary cable adjustment bracket reaches the center of its travel.

Step 4. Cut a length of cable (or use replacement cable of exact length) approximately 15 inches long, knot one end tightly and then fuse the knotted end of the cable with a match.

CAUTION

BE SURE THAT THE SPRING TENSION HAS BEEN RELEASED AS DIRECTED IN STEP 2, BEFORE PERFORMING STEP 5.

Step 5. If the old rotary cable is still threaded through the rotary pulley system, cut off the knotted ends of the cable. (The end knotted against the index wheel and the end knotted against the rotary cable adjustment bracket) and proceed with Step 8. If the old rotary cable has been removed from the printer proceed with Step 6.

Step 6. Thread the new cable through the hole in the rotary cable adjustment bracket (Figure 5-20).

Step 7. Thread the free end of the rotary cable over the top of the letters-figures pulley (Figure 5-19) under the next idler pulley, over and around the pulley on the rotary strip, through the hole in the right frame, under the idler pulley up and over the upper idler pulley and then under and over the front of the index wheel. Skip Step 8 and proceed with Step 9.

Step 8. Thread the new cable through hole in the unknotted end of the new rotary cable to the end of the old cable and pull on old rotary cable near the index wheel until the new cable is drawn out of the printer.

Step 9. Release the print function clutch and rotate the mainshaft until the function cam follower falls to the low of its cam; then rotate the index wheel counterclockwise so that the index mark is two notches away from the detent pawl. (See Figure 5-20).

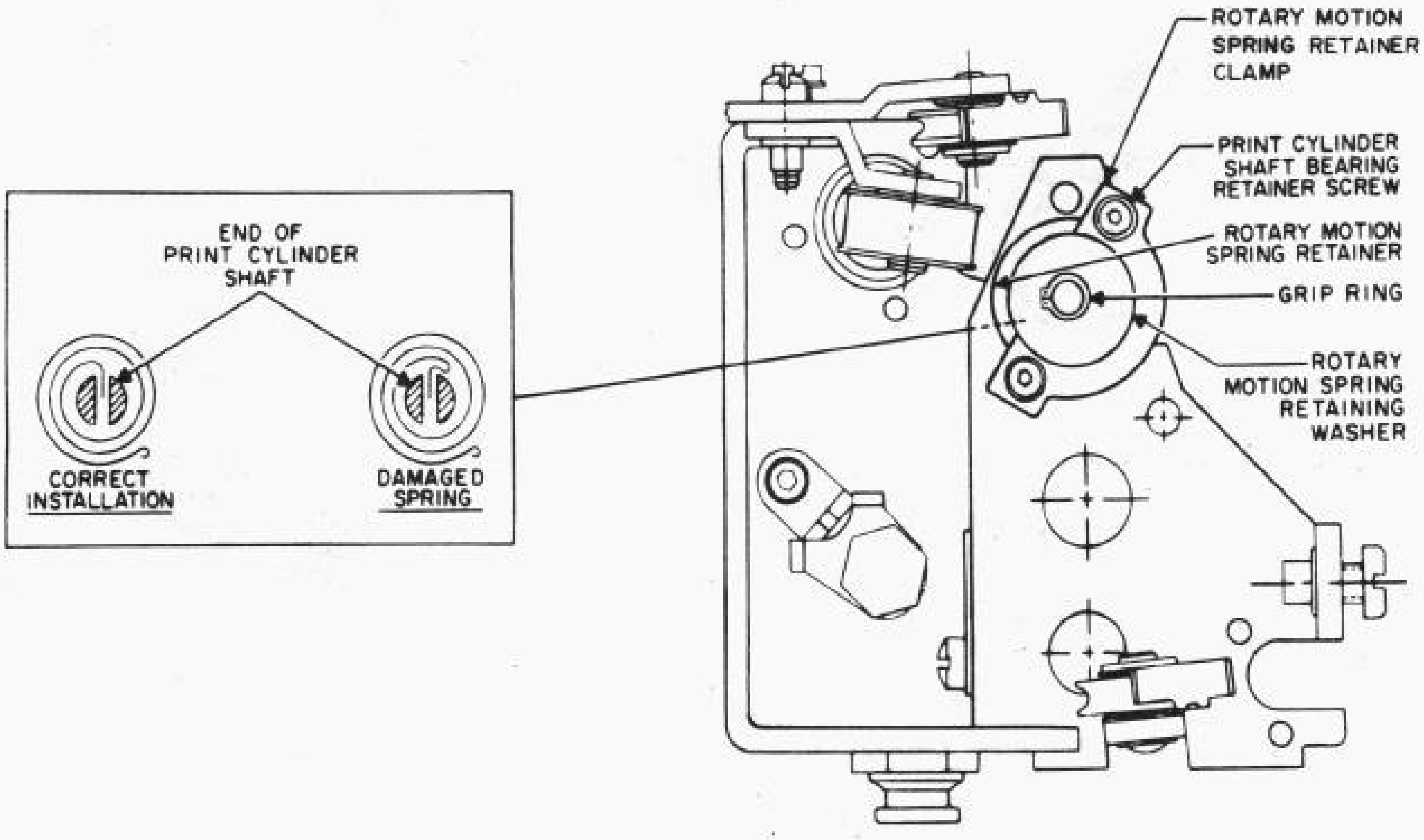

ROTARY MOTION SPRING RETAINER CLAMP
PRINT CYLINDER SHAFT BEARING RETAINER SCREW
ROTARY MOTION SPRING RETAINER
GRIP RING
ROTARY MOTION SPRING RETAINING WASHER
END OF PRINT CYLINDER SHAFT
CORRECT INSTALLATION
DAMAGED SPRING

Figure 5-18. Rotary Cable Replacement, Left Side View of Printer

Step 10. Thread the cable through the hole in the index wheel and tie a tight knot approximately 1/4 inch from the index wheel and fuse the end of the cable.

Step 11. Rotate the mainshaft until the print function cam stops rotating.

Step 12. Turn the rotary motion spring retainer 3-1/2 turns counterclockwise and clamp tightly.

Step 13. Turn the rotary cable adjustment screw until the dot on the index wheel is opposite the rotary detent pawl pin.

Step 14. Check the rotary slide alignment adjustment (Paragraph 5-7e(3)(b) and then perform the rotary cable adjustment (Paragraph 5-7e(3)(c) with the unit under power.

NOTE

> A check of rotary slide alignment is recommended after 24 to 48 hours of operation.

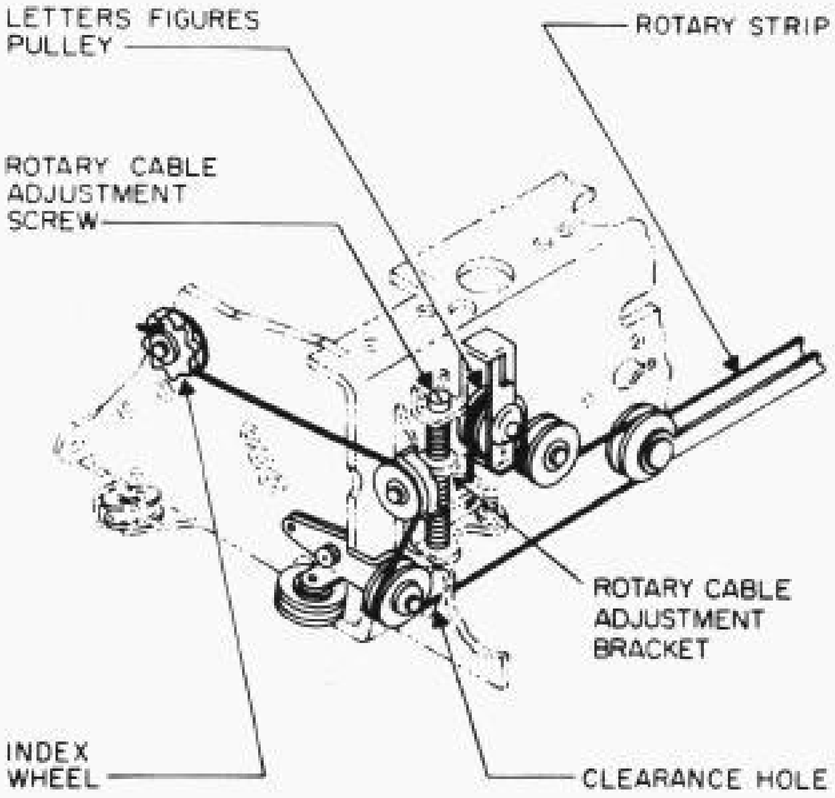
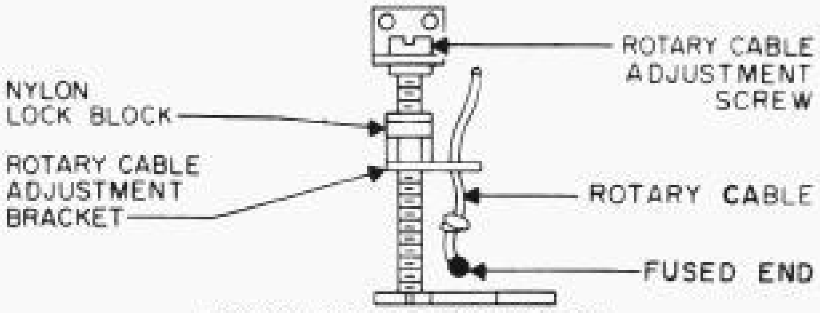
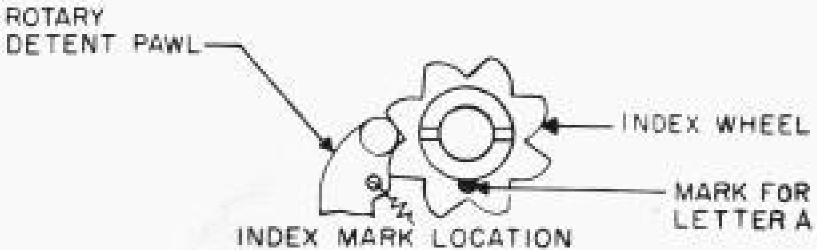

LETTERS FIGURES PULLEY
ROTARY STRIP
ROTARY CABLE ADJUSTMENT SCREW
ROTARY CABLE ADJUSTMENT BRACKET
INDEX WHEEL
CLEARANCE HOLE

Figure 5-19. Rotary Cable Replacement Cable Threading Diagram


ROTARY CABLE ADJUSTMENT SCREW
NYLON LOCK BLOCK
ROTARY CABLE ADJUSTMENT BRACKET
ROTARY CABLE
FUSED END

ROTARY CABLE TERMINATION



INDEX MARK LOCATION

Figure 5-20. Rotary Cable Replacement, Detail Views

(4) PRINT HAMMER CABLE REPLACEMENT.

NOTE

> It is not necessary to perform the preloading instructions contained in Steps 1 and 2 unless the takeup drum spring tension has been released. (Refer to Figure 5-21).

Step 1. Preload the takeup drum by turning it counterclockwise no less than two turns and no more than three turns, aligning the hole in the takeup drum with the one in the takeup drum bracket.

Step 2. Insert a hex wrench or other similar object through the holes in the takeup drum bracket to prevent the takeup drum from unwinding.

NOTE

> Perform the following step only when the printer cables are still intact.

Step 3. Depress the carriage return lever to disengage the check and advance pawls from the advance ratchet and manually rotate the advance drum clockwise to the limit of its travel to insure that full carriage return occurs.

NOTE

> This positions the print cylinder and hammer at the beginning of the line.

Step 4. Cut a length of cable (or use exact length replacement cable) approximately 31 inches long, knot and fuse one end.

Step 5. Hook the knotted end of the print hammer cable in the outer groove slot on the takeup drum.

Step 6. Wind the cable one turn counterclockwise around the takeup drum, (as viewed from the left side of printer) off the bottom of the drum, and through the pulley located on the left-hand corner of the printer.

Step 7. Thread the cable through the clearance hole adjacent to the pulley.

Step 8. Place the printer in letter A.

Step 9. Draw the hammer cable across the front of printer and twist the cable around both hammer bracket lugs to form a figure eight, while maintaining hammer face alignment with the letter A on print cylinder.

Step 10. With the hammer cable secured to hammer bracket lugs, draw the cable across the front of the printer and thread it through the clearance hole in the right frame (Figure 5-22).

Step 11. Thread the cable around the pulley just outside the clearance hole and directly into the outer groove slot in the bottom of the advance drum.

Step 12. String the hammer cable under its clamp on the advance drum and tighten the clamp.

NOTE

> When print hammer cable is replaced, a check of hammer alignment to the letter A after 24 to 48 hours of operation is recommended.

(4) PRINT HAMMER CABLE REPLACEMENT.

NOTE

It is not necessary to perform the preloading instructions contained in Steps 1 and 2 unless the takeup drum spring tension has been released. (Refer to Figure 5-21).

Step 1. Preload the takeup drum by turning it counterclockwise no less than two turns and no more than three turns, aligning the hole in the takeup drum with the one in the takeup drum bracket.

Step 2. Insert a hex wrench or other similar object through the holes in the takeup drum bracket to prevent the takeup drum from unwinding.

NOTE

Perform the following step only when the printer cables are still intact.

Step 3. Depress the carriage return lever to disengage the check and advance pawls from the advance ratchet and manually rotate the advance drum clockwise to the limit of its travel to insure that full carriage return occurs.

NOTE

This positions the print cylinder and hammer at the beginning of the line.

Step 4. Cut a length of cable (or use exact length replacement cable) approximately 31 inches long, knot and fuse one end.

Step 5. Hook the knotted end of the print hammer cable in the outer groove slot on the takeup drum.

Step 6. Wind the cable one turn counterclockwise around the takeup drum, (as viewed from the left side of printer) off the bottom of the drum, and through the pulley located on the left-hand corner of the printer.

Step 7. Thread the cable through the clearance hole adjacent to the pulley.

Step 8. Place the printer in letter A.

Step 9. Draw the hammer cable across the front of printer and twist the cable around both hammer bracket lugs to form a figure eight, while maintaining hammer face alignment with the letter A on print cylinder.

Step 10. With the hammer cable secured to hammer bracket lugs, draw the cable across the front of the printer and thread it through the clearance hole in the right frame (Figure 5-22).

Step 11. Thread the cable around the pulley just outside the clearance hole and directly into the outer groove slot in the bottom of the advance drum.

Step 12. String the hammer cable under its clamp on the advance drum and tighten the clamp.

NOTE

When print hammer cable is replaced, a check of hammer alignment to the letter A after 24 to 48 hours of operation is recommended.

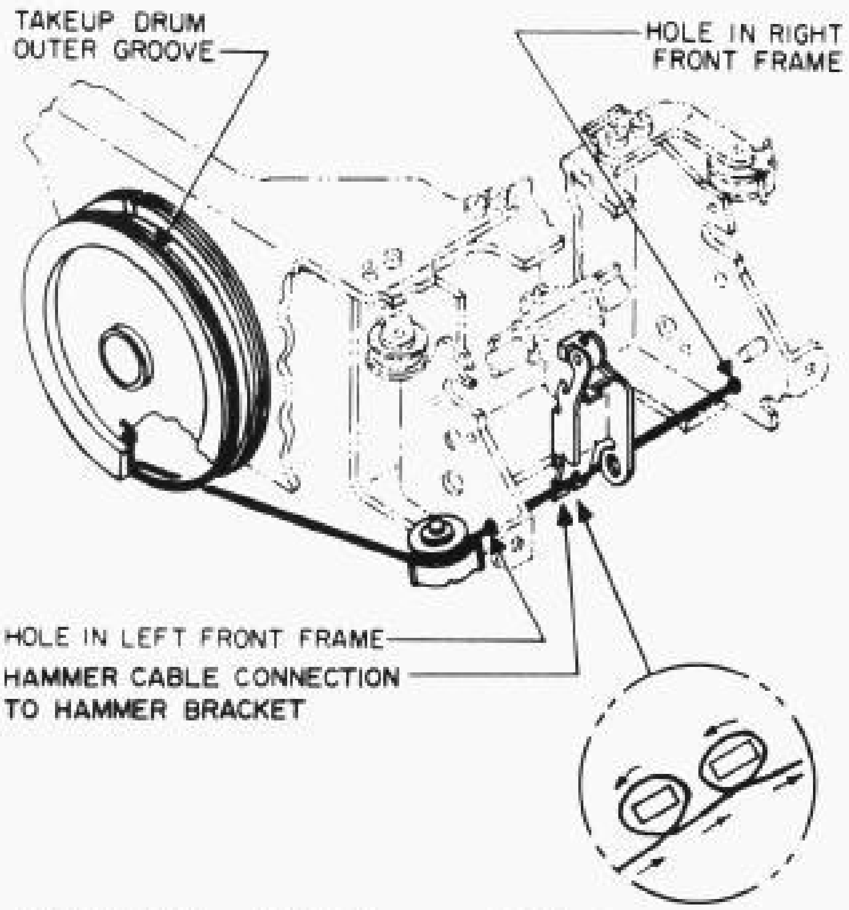

TAKEUP DRUM OUTER GROOVE
HOLE IN RIGHT FRONT FRAME
HOLE IN LEFT FRONT FRAME
HAMMER CABLE CONNECTION TO HAMMER BRACKET

Figure 5-21. Print Hammer Cable Replacement, Cable Threading Diagram

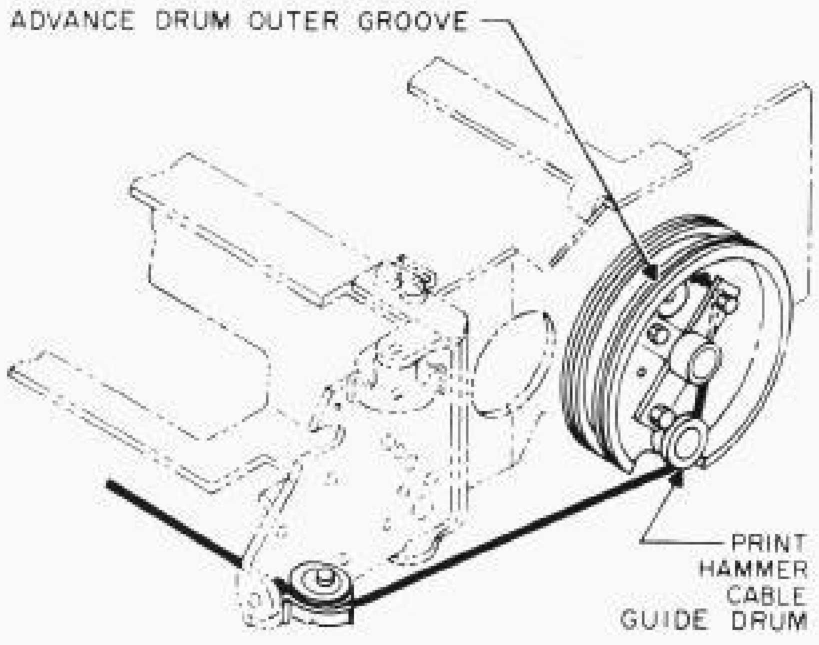


Figure 5-22. Print Hammer Cable Replacement, Securing Cable to Advance Drum

(5) RETURN CABLE REPLACEMENT

NOTE

It is not necessary to perform the preloading instructions contained in Steps 1 and 2 unless the takeup drum spring tension has been released (Refer to Figure 5-23).

Step 1. Preload the takeup drum by turning it counterclockwise no less than two turns and no more than three turns, aligning the hole in the takeup drum with the one in the takeup bracket.

Step 2. Insert a hex wrench or other similar object through the holes in the takeup drum and the takeup drum bracket to prevent the takeup drum from unwinding.

Step 3. Depress the carriage return lever to disengage the check and advance pawls from the advance ratchet and manually rotate the advance drum clockwise to the limit of its travel to ensure that full carriage return occurs.

NOTE

This step should result in having both advance and takeup drums in their full clockwise limits and the print cylinder and hammer all the way to the left hand margin.

Step 4. Cut a length of cable (or use replacement cable of exact length) approximately 31 inches long; knot and fuse one end.

Step 5. Remove the old return cable and hook the knotted end of the new return cable (red) in the inner groove slot of the takeup drum and thread the cable through the upper pulley at the top of left front corner of the printer.

Step 6. See Figure 5-24. Pull the cable across the front of the printer; thread through the pulley on the right front side and then to the inner groove of the advance drum.

Step 7. Wind the cable one turn clockwise around the advance drum (as viewed from the right side of printer) and then thread it through the slot in the advance drum.

Step 8. Pull the cable across the groove in the adjacent guide drum and lightly clamp it under the upper left clamp, leaving several inches of loose cable. Knot and fuse the end of the cable.

Step 9. Rotate the advance drum counterclockwise until the print cylinder is halfway across the line and then depress the carriage return lever and observe that carriage return occurs. Carriage return should be rapid. If carriage return is slow (print cylinder hesitates or moves slowly during carriage return) proceed with Step 10.

Step 10. Readjust the tension on the return cable, loosening the return cable until carriage return is rapid.

NOTE

There should be no return cable overlap in the takeup drum when the print cylinder and hammer are in the full carriage return position.

NOTE

A check of return cable tension Steps 9, and 10 should be performed after 24 to 48 hours of operation.

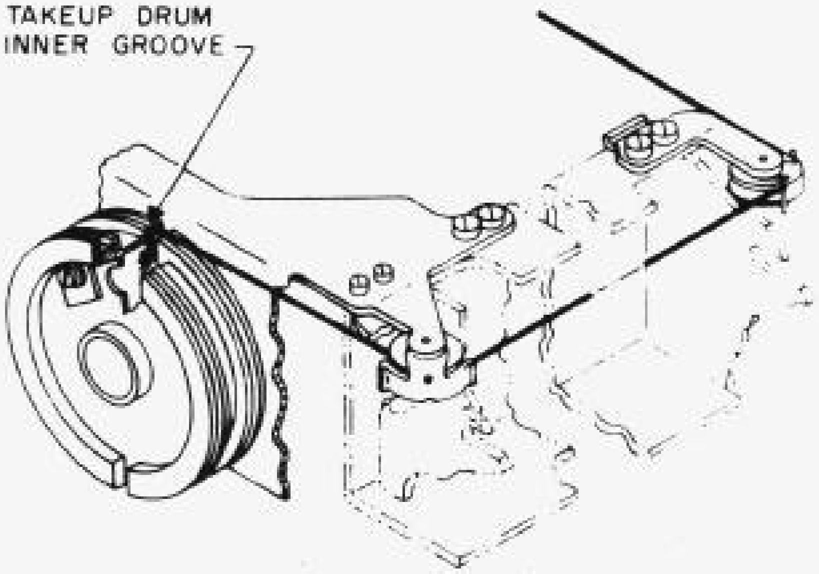


Figure 5-23. Return Cable Replacement, Cable Threading Diagram

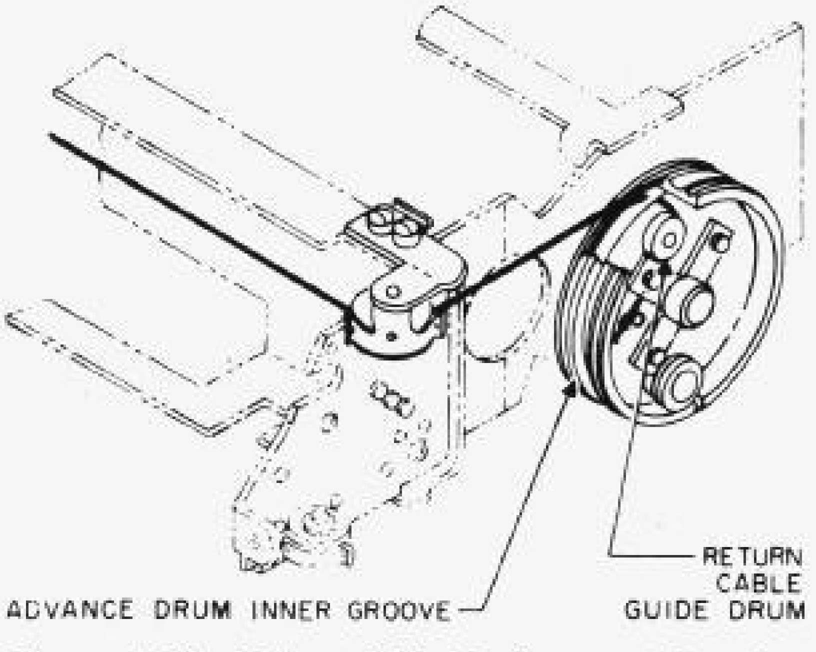


Figure 5-24. Return Cable Replacement Securing Cable to Advance Drum

(6) LATERAL POSITIONING BELT REPLACEMENT.

Step 1. Remove retaining rings (2, Figure 5-25) and yoke pin (3).

Step 2. Remove old lateral positioning belt (1) from around pulleys (5, 6, and 7).

Step 3. Remove retaining ring from bottom of slide pin (9) in lateral slide yoke (10).

Step 4. Remove old lateral positioning belt (1) from lateral slide yoke (10).

Step 5. Insert new lateral positioning belt in yoke block (4).

Step 6. Insert yoke pin (3) through belt loop and replace retaining rings (2) to hold pin (3) in yoke (4).

Step 7. Thread new lateral positioning belt (1) around number 5 lateral pulley (5), number 4 lateral pulley (6), number 3 lateral pulley (7), and transfer pulley (8).

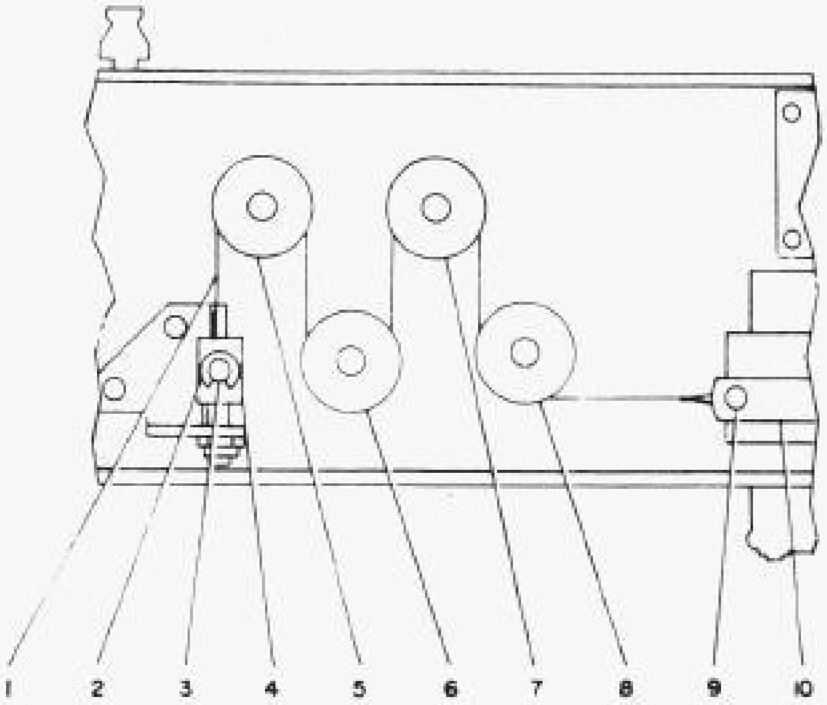
Step 8. Insert belt loop in lateral slide yoke (10).

Step 9. Insert slide pin (9) through lateral slide yoke (10) and loop of new lateral positioning belt (1); secure with retaining ring.

Step 10. Perform lateral slide alignment adjustment (Paragraph 5-7e).

NOTE

Ensure that lapped portion of belt is to the outside of pulley.



KEY	ITEM
1	Lateral Positioning Belt
2	Retaining Ring
3	Yoke Pin
4	Yoke Block
5	Number 5 Lateral Pulley
6	Number 4 Lateral Pulley
7	Number 3 Lateral Pulley
8	Transfer Pulley
9	Slide Pin
10	Lateral Slide Yoke

Figure 5-25. Lateral Positioning Belt Replacement

(7) ROTARY POSITIONING BELT REPLACEMENT.

Step 1. Remove retaining rings (2, Figure 5-26) from rotary yoke pin (3).

Step 2. Remove old rotary positioning belt loop from rotary yoke (4).

Step 3. Remove old rotary positioning belt (1) from around number 2 rotary pulley (10), number 1 rotary pulley (5) and transfer pulley (6).

Step 4. Remove retaining rings (8) from rotary slide pin (9).

Step 5. Remove rotary slide pin (9) from rotary slide yoke (7).

Step 6. Remove old rotary positioning belt from the printer.

Step 7. Insert loop of new rotary positioning belt in rotary yoke (4).

Step 8. Insert rotary yoke pin (3) through rotary yoke (4) and loop of new rotary positioning belt.

Step 9. Replace retaining rings (2) to secure rotary yoke pin (3) in rotary yoke (4).

Step 10. Thread new rotary positioning belt around number 2 rotary pulley (10), number 1 rotary pulley (5), and transfer pulley (6).

Step 11. Insert loop of new rotary positioning belt (1) in rotary slide yoke (7).

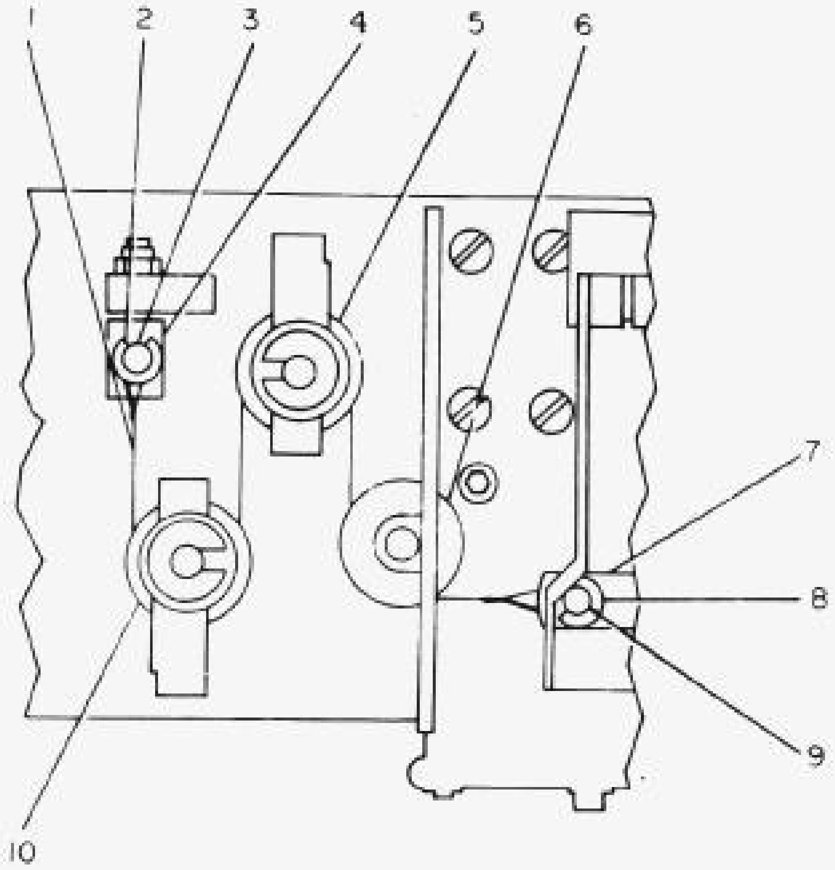
Step 12. Insert rotary pin (9) through rotary slide yoke (7) and loop of rotary positioning belt (1).

Step 13. Insert retaining rings (8) in rotary slide pin (9) to secure pin in rotary slide yoke (7).

NOTE

Ensure that lapped portion of belt is outside of pulley.

Step 14. Perform rotary slide adjustment procedure (Paragraph 5-5e(3)(b).



KEY	ITEM
1	Rotary Positioning Belt
2	Retaining Ring
3	Rotary Yoke Pin
4	Rotary Yoke
5	Number 1 Rotary Pulley
6	Transfer Pulley
7	Rotary Slide Yoke
8	Retaining Rings (Rotary Slide Pin)
9	Rotary Slide Pin
10	Number 2 Rotary Pulley

Figure 5-26. Rotary Positioning Belt Replacement

(8) MASTER PULSING CONTACT ASSEMBLY REPLACEMENT.

NOTE

Six-leaf master pulsing contact assemblies may be identified by reddish-brown glyptal spot on end of mounting screws.

Step 1. Remove the keyboard from the electrical chassis (Paragraph 5-5b(5).

Step 2. Loosen both upper and lower spring leaf adjustment setscrews (1, Figure 5-27 approximately four or five turns using the insulated 1/16 inch internal-hex wrench supplied in Tool Kit, MITE Corporation Part Number 7140.

Step 3. Loosen master pulsing cam follower.

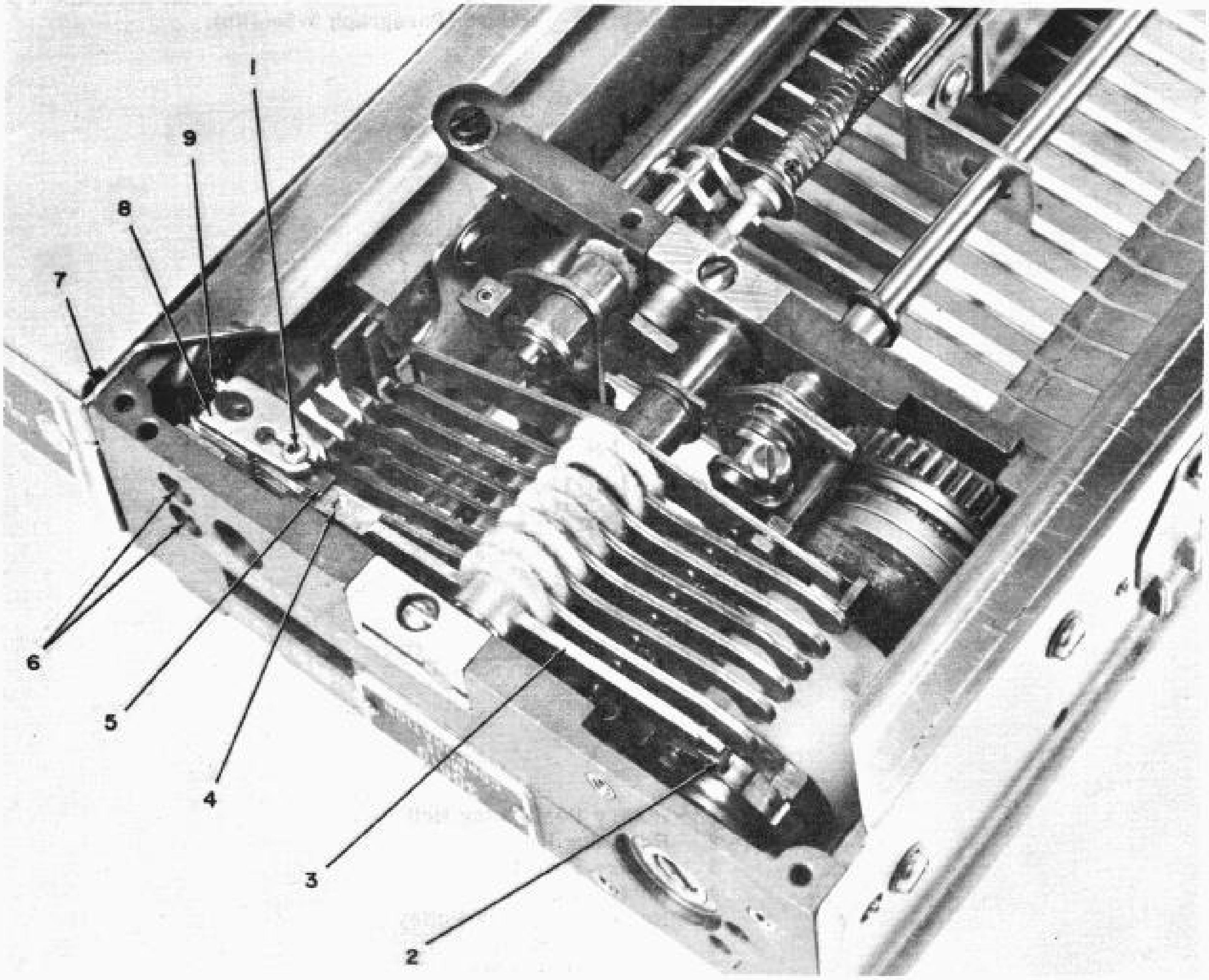
Step 4. Swing keyboard contact actuator (5) 90 degrees in a clockwise direction as observed from the bottom of keyboard.

Step 5. Remove two screws and lock washers (6).

Step 6. Pull master pulsing contact assembly (8) out from bottom of keyboard and unsolder the three wires attached to the master pulsing contact assembly.

NOTE

It may be necessary to remove the space bar keyboard cover (7) to permit access to yellow wire to provide slack. Slack is available on all three wires by pulling gently through lacing or plastic tubing, whichever is provided.



KEY	ITEM
1	Adjustment Setscrew
2	Cam Follower Tip
3	Master Pulsing Cam Follower
4	Master Pulsing Cam Follower Screw
5	Contact Actuator
6	Attaching Screws
7	Keyboard Cover
8	Master Pulsing Contact Assembly
9	Contact Lead Wires (three)

Figure 5-27. Master Pulsing Contact Assembly Replacement

Step 7. Solder the three wires (9) to the master pulsing contact assembly; green to the top master pulsing contact adjustment screw bracket near screw head; yellow to both upper and lower leaf contact assemblies and red to lower master pulsing contact adjustment screw bracket.

Step 8. Slide master pulsing contact assembly (8) up into place in keyboard frame and secure loosely with attaching screws (6).

NOTE

The slack on all three wires must be taken up to reposition master pulsing contact assembly (8).

Step 9. Slide the lacing or plastic tubing back into position.

Step 10. Replace space bar keyboard cover (7).

Step 11. Swing keyboard contact actuator (5) back into position between upper and lower leaf contact assemblies.

Step 12. Tighten master pulsing cam follower screw (4).

NOTE

Do not bend excessively when spreading upper and lower leaf contact assemblies.

Step 13. Place a shim (0.010 inch for six-leaf master pulsing contact assemblies or 0.005 inch for two-leaf master pulsing contact assemblies under master pulsing cam follower tip (2) while on the low of the cam; move the master pulsing contact assembly until keyboard contact actuator (5) is centered between upper and lower leaves of contact assemblies and tighten attaching screws (6).

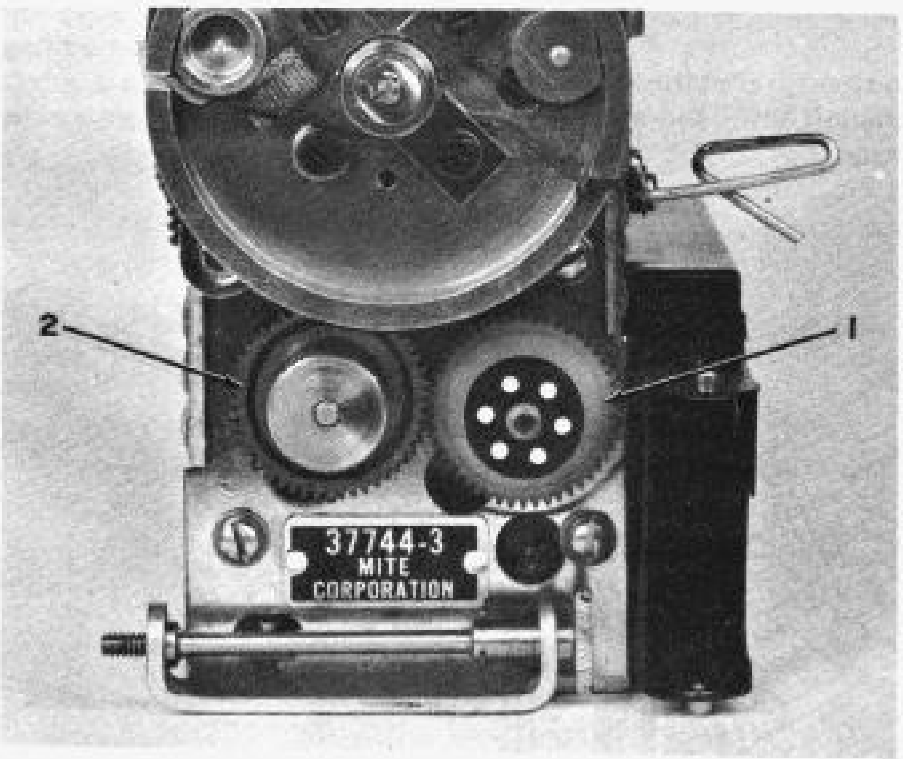
Step 14. Adjust master pulsing contacts in accordance with master pulsing contact assembly adjustment procedure in Paragraph 5-5e(25)9h). Use the insulated 1/16 inch internal-hex wrench supplied in Tool Kit, Part Number 7140.

d. STANDARD PROCEDURES. - A number of the procedures described in the following paragraphs are called for repeatedly during performance of adjustment and replacement procedures. These procedures minimize the number of tools required to service the unit and permit many of the adjustments to be performed with power off.

WARNING

OPERATION OF THIS EQUIPMENT INVOLVES VOLTAGES WHICH ARE DANGEROUS TO LIFE. DO NOT SERVICE OR ADJUST THE TELETYPEWRITER SETS WHILE THEY ARE RUNNING UNLESS EXTREME CAUTION IS USED.

(1) TURNING THE MAINSHAFT BY HAND. - This operation is accomplished by rotating the speed change gear (1, Figure 5-28) clockwise, or the idler gear (2) counterclockwise. This operation will turn any of the clutches which have been released and consequently coupled to the mainshaft. When the start clutch is released and the mainshaft is turned, it will also rotate the timing cam shaft.



KEY	ITEM
1	Speed Change Gear
2	Idler Gear

Figure 5-28. Turning the Mainshaft by Hand

(2) RELEASING THE START CLUTCH. - The preferred method of releasing the start clutch is accomplished electrically by pushing the **BREAK** button on the keyboard. The start clutch can be mechanically released with the stop magnet de-energized, by depressing the start side of the armature toward the start coil (armature #2 space side) (Figure 5-29) which will allow the start paddle to fall and release the clutch finger.

CAUTION

IF THE START CLUTCH HAS BEEN RELEASED ELECTRICALLY IT IS NECESSARY TO TURN THE MOTOR SWITCH OFF AND WAIT APPROXIMATELY 30 SECONDS PRIOR TO RECONNECTING THE MOTOR PLUG.

(3) STOPPING THE START CLUTCH. - When performing or checking adjustments (without power) it may be necessary to manually rotate the mainshaft numerous times yet maintain the same mark and space condition (letters A or M, figures, functions, etc.) setup on the mainshaft. Stopping the start clutch permits continuous rotation of the mainshaft, without disturbing a preset mark and space condition and also facilitates the setting up of the mainshaft for the mark and space condition desired. To stop the start clutch proceed as follows:

CAUTION

EXERCISE CARE WHEN HOLDING IN THE ARMATURE TO AVOID DISTORTION OF THE ARMATURE PIVOT POINTS.

Step 1. Hold in the top portion of armature (Figure 5-29), while rotating the mainshaft until the start clutch comes to the stop position.

NOTE

It might be necessary to rotate the mainshaft a number of times while holding in on the armature to stop the start clutch.

Step 2. Rotate the mainshaft a number of times to be certain that the start clutch and all clutches are stopped.

NOTE

Since a clutch will now change mark or space position only after manually pulling out the clutch release finger, stopping the start clutch, greatly facilitates setting up the mainshaft.

(4) RELEASING THE OTHER CLUTCHES. - Clutches #1 through #5 and the function clutch can most easily be released, by using a spring hook to pull the clutch release finger away from the clutch. The line feed, letters-figures, and the carriage return clutches are most easily released by operating their off-line function pushers. In the case of letters, however, the function clutch must also be released and the off-line pusher held in while the mainshaft is turned through 180 degrees rotation, thus operating the function cam follower for one full cycle.

(5) PUSHING CLUTCHES INTO POSITION. - On occasion it will be inconvenient to turn clutches by rotating the mainshaft as this may disturb the position of previously positioned clutches. In this case, the clutch to be moved can be pushed around into position by pushing against the backstop notch (Figure 5-30) with a screwdriver, while holding out the proper clutch release finger with a spring hook.

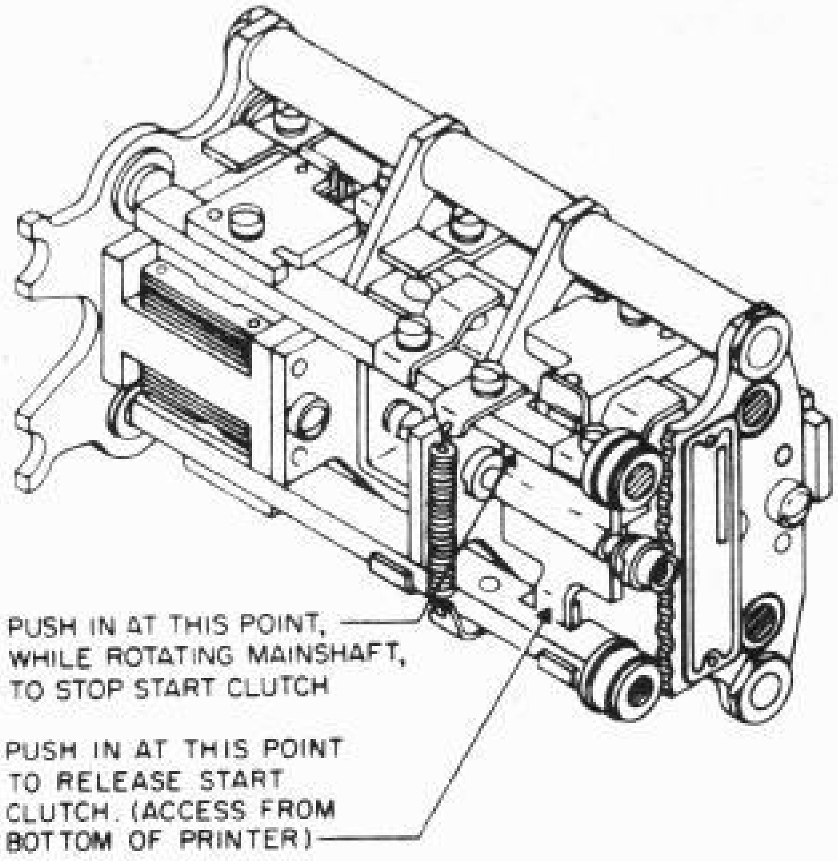

PUSH IN AT THIS POINT, WHILE ROTATING MAINSHAFT, TO STOP START CLUTCH
PUSH IN AT THIS POINT TO RELEASE START CLUTCH. (ACCESS FROM BOTTOM OF PRINTER)

Figure 5-29. Release of Start Clutch

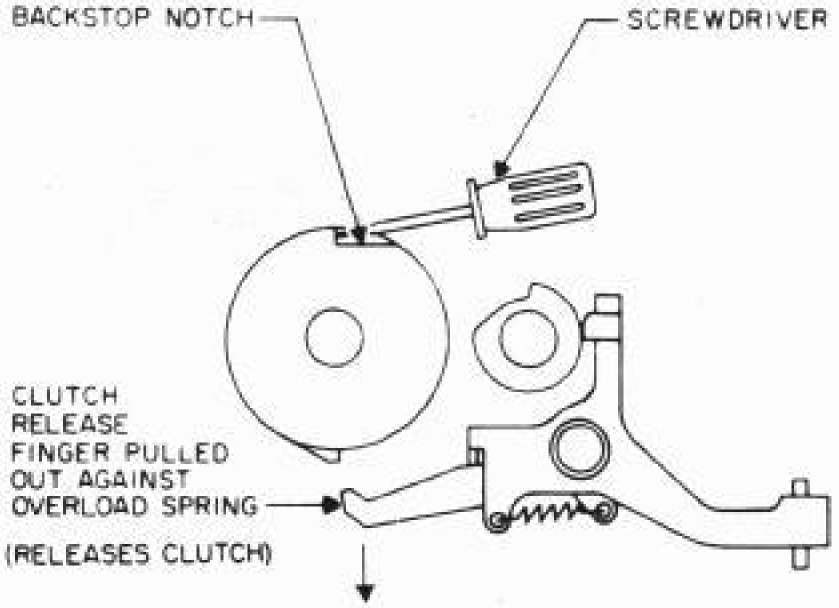


Figure 5-30. Pushing Clutches into Position

(6) PUTTING THE PRINTER IN THE LETTER A AND PERIOD POSITION. - This operation places all of the type positioning cam followers on the high portions of their cams. It is performed by locating the #1 and #2 clutches on the mark side (held by the top fingers) and the #3, #4 and #5 clutches located on the space side (held by the bottom fingers). The letters-figures cam follower must be located on the letters side (high side of the cam).

(Letters A position -- mark-mark-space-space-space) - The converse of this operation would be to place the printer in the period position by having clutches #1 and #2 on the low portion of cam (held by the top fingers). Letters-figures clutch should then be rotated so that cam follower will fall to the low portion of cam.

(Period position -- space-space-mark-mark-mark) Assembly of the front and rear halves will be much easier if the clutches are in the period position. After mating these assemblies it is recommended that clutches then be put in the letter A position during all power off adjustments.

(7) MANUAL ADVANCE AND CARRIAGE RETURN. The ability to advance print cylinder and hammer (moving them to the right across the front of the printer) and affect carriage return (movement of print cylinder and hammer to the left hand margin) expedite the performance of a number of adjustment procedures.

(a) MANUAL ADVANCE. - Using the thumb and forefinger, rotate advance drum (located on the right side of the printer) counterclockwise to manually advance print cylinder and hammer to the right.

(b) MANUAL CARRIAGE RETURN. - Depress carriage return lever (lever with a vertical link to the check pawl, located on the right side of the printer). Observe that when carriage return lever is depressed, both advance pawl and check pawl are disengaged from advance drum ratchet, releasing advance drum for carriage return.

e. ADJUSTMENT PROCEDURES. - A complete adjustment of teletypewriter set can be accomplished by following adjustment sequence presented in this section. The teletypewriter should be readjusted following major disassembly, parts replacement, or involved trouble shooting. Minor parts replacement or correction of minor operating malfunctions requires only that the section of teletypewriter affected be readjusted. When making these adjustments, use care not to disturb related adjustments indicated as such in the adjustment procedure.

NOTE

It is suggested that no adjustment procedure be accomplished prior to making sure that the suspect area is out of adjustment.

WARNING

OPERATION OF THE EQUIPMENT INVOLVES VOLTAGES WHICH ARE DANGEROUS TO LIFE. USE EXTREME CARE WHEN SERVICING OR ADJUSTING THE TELETYPEWRITER WHILE IT IS RUNNING.

(1) CLUTCH BACKSTOP ADJUSTMENT. - The backstops for all clutches must be adjusted for optimum operation of each clutch. The backstop prevents the clutch from chattering when it is in the stop (disengaged) position and consequently prevents overloading of the motor and also preloads clutch cage for rapid engagement of clutch with mainshaft, when clutch is released.

NOTE

Ensure that the clutch backstops perform in accordance with the requirements established in Steps 3 and 6. If the requirements are not met, perform the following adjustment sequence.

Step 1. Loosen the clutch backstop clamp screw (Figure 5-31).

Step 2. With clutch in the stop position, turn backstop eccentric until the backstop lever falls into its notch in clutch cage.

Step 3. Check backstop action (controlled by the eccentric setting) by releasing appropriate clutch and turning mainshaft by hand while observing that backstop lever drops into its notch in clutch cage simultaneously with the stop of clutch (tab) by clutch release.

NOTE

Print function clutch backstop action must be checked with power applied to the equipment.

Step 4. Readjust backstop eccentric if backstop operation is not as described in Step 3.

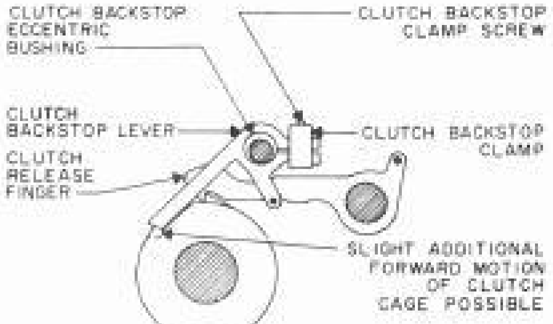
NOTE

The action of line feed, letters-figures, and carriage return clutches can best be observed by standing printer on its back plate and viewing from the bottom.

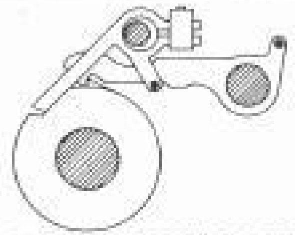
Step 5. Backstop should engage clutch so that slight additional forward motion of the engaged clutch disc is possible. Repeat Steps 1, 2, and 3 if no forward motion of engaged backstop clutch disc is possible.

Step 6. Pull upward on clutch release and check for slight forward motion of clutch stop tab. If clutch stop tab does not pivot forward when clutch release is pulled upward the backstop eccentric is improperly adjusted and Steps 1 through 3 should be repeated.

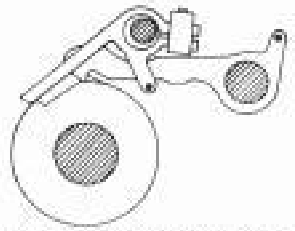
Step 7. Tighten clutch backstop clamp screw when backstop is properly aligned.


CLUTCH BACKSTOP ECCENTRIC BUSHING
CLUTCH BACKSTOP CLAMP SCREW
CLUTCH BACKSTOP LEVER
CLUTCH BACKSTOP CLAMP
CLUTCH RELEASE FINGER
SLIGHT ADDITIONAL FORWARD MOTION OF CLUTCH CAGE POSSIBLE

CLUTCH BACKSTOP CORRECTLY ADJUSTED



CLUTCH BACKSTOP EFFECTIVELY TOO SHORT



CLUTCH BACKSTOP EFFECTIVELY TOO LONG

Figure 5-31. Clutch Back-Stop Adjustment

(2) RANGE CALIBRATION.

(a) PRELIMINARY RANGE DIAL ADJUSTMENT. - This adjustment is used to mechanically preposition range dial at its midpoint and does not constitute a calibration check.

Step 1. Unlock range dial by pulling out the lock knob (8, Figure 5-32) as far as possible and then rotate knob fully to its clockwise limit. Push knob in toward printer locking it in this position.

Step 2. Disengage retaining lever (5) from conical range finder slide lock (3) and pull complete range dial (1) out until range pinion (4) is no longer engaged with range adjustment gear segment.

Step 3. Rotate knob (8) until pointer (7) is centered in the uncalibrated portion of the scale. Ensure that pointer is located as close as possible to the center of the uncalibrated portion of scale when performing Step 3.

Step 4. Push knob toward printer, rotating slightly back and forth, until gears mesh and retaining lever (5) locks in its groove in the range dial.

Step 5. Unlock range dial (1) by pulling knob (8) out; set dial (1) at 60.

Step 6. Push knob (8), all the way in to lock dial (1).

(b) RANGE ADJUSTMENT. - Range dial adjustment is performed by either receiving a message over a signal loop from a remote station, or with the equipment patched for local loop (line battery supplied internally) while typing a test message from the equipment's keyboard. Setting range dial at its point of optimum operation assures optimum acceptance of signal by teletypewriter. Refer to Figure 5-32.

Step 1. While either receiving a message from a remote station, or typing a test message (RY's, AM's, etc.), unlock range dial by pulling out range finder knob.

Step 2. Rotate range finder knob counterclockwise gradually and record the number indicated on range dial (low point) where the message is no longer distorted.

Step 3. While continuing to type the test message or receive the message from the remote station; turn the knob clockwise toward the high end of the scale past the point of optimum operation until the message is again garbled.

Step 4. Turn range finder knob clockwise gradually and record the number indicated on the dial (high point) where the message is no longer garbled.

Step 5. Calculate point of optimum operation by using the following formula:

$$\frac{\text{High} + \text{Low}}{2} = \text{Point of Optimum Operation}$$

$$\text{Example: } \frac{100 + 20}{2} = 60 \text{ (Optimum Setting)}$$

Step 6. Turn range dial so that pointer is directly on number established as point of optimum operation. In the example above, point of optimum operation would be 60 on the range dial.

Step 7. Push range finder knob against printer to ascertain that mechanism is adequately locked.

(c) TIMING MARK ALIGNMENT. - If after repeated performance of preliminary range dial adjustment, it is impossible to get a median range reading near the center of the calibrated portion of range dial, it will be necessary to perform the following adjustment procedure:

Step 1. Determine the location of median range reading on range dial.

NOTE

If median range reading is on high side of dial it will be necessary to retard timing shaft relationship to the mainshaft. If median reading is on low side of dial it will be necessary to advance timing shaft relationship to the mainshaft.

Step 2. Remove printer from chassis and stand it on its backplate.

Step 3. Make a small diagram showing timing mark relationship as it exists. (Refer to Figure 4-11 for location of timing marks only.)

Step 4. Remove retaining ring to the left of timing cam shaft gear, pressing it out of the groove in the shaft with a screwdriver.

Step 5. Slide timing cam shaft gear to the left, disengaging it from start clutch gear.

NOTE

Do not lose timing cam shaft gear key, when sliding gear to the left. Be sure that the key is in place when the gear is moved back into position in Step 7.

Step 6. If median reading is on high side of the range dial, offset timing cam shaft and its gear one dot (timing mark) to the right, referring to diagram prepared in Step 3. If median range reading is on low side of range dial, offset timing shaft and its gear one dot (timing mark) to the left.

Step 7. Re-engage timing cam shaft gear with start clutch gear.

Step 8. Replace retaining ring, removed in Step 4, in its notch to the left of timing cam shaft gear.

Step 9. Perform preliminary range dial adjustment (Paragraph 5-5e(2)(a) and then range dial adjustment (Paragraph 5-5e(2)(b)).

(3) ROTARY SPRING, FUNCTION SLIDE ALIGNMENT AND CABLE ADJUSTMENTS. - The following series of adjustments are related in that they affect rotary motion of type cylinder and should be performed in sequence after replacement of rotary spring, or cable. The adjustments can be performed separately, but a check should be made of all adjustments after performing any one of the series. In addition, rotary stroke adjustment permits further refinement of rotary selection. Rotary stroke adjustment procedure is covered in Paragraph 5-5e(17)(a) and should be performed only after a thorough check of rotary spring, slide, and cable adjustments, Paragraph 5-5e(17).

(a) ROTARY SPRING ADJUSTMENT. - The rotary spring adjustment assures proper spring tension for rotary action of type cylinder.

Step 1. Place printer in letters A.

CAUTION

RAPID UNWINDING OF ROTARY SPRING WHEN PERFORMING THE FOLLOWING STEPS WILL SERIOUSLY DAMAGE THE SPRING.

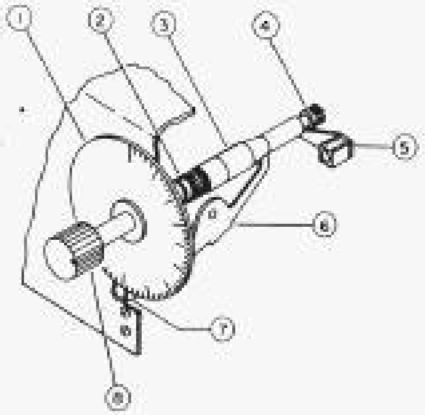
Step 2. While holding rotary spring housing (located on the left end of type cylinder shaft), loosen two housing clamp screws and allow spring housing to rotate slowly until all tension is removed from rotary spring.

Step 3. Remove retaining ring and two washers (nylon, steel) on end of rotary spring housing.

Step 4. Check rotary spring (Figure 5-33) for damage and replace if necessary.

Step 5. Replace two washers (place the nylon washer against rotary spring) on end of rotary spring housing and secure with retaining ring.

Step 6. Turn rotary housing 3-1/2 turns counterclockwise and secure housing by tightening two housing clamp screws.



KEY	ITEM
1	Range Dial
2	Range Finder Lock Helical Spring
3	Conical Range Finder Slide Lock
4	Range Pinion
5	Retaining Lever
6	Range Finder Lock Lever
7	Range Dial Pointer
8	Range Finder Lock Knob

Figure 5-32. Range Dial Mechanism

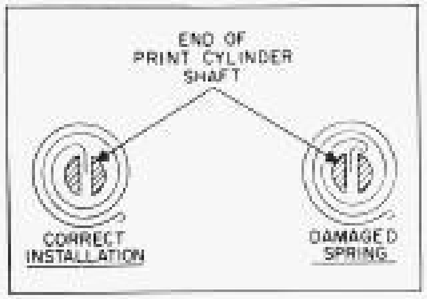


Figure 5-33. Rotary Spring Adjustment

(b) ROTARY FUNCTION SLIDE ADJUSTMENT. - Rotary function slide adjustment is performed to assure proper alignment of slide notches with sensing fingers to permit function selection. Check rotary function slide alignment as follows:

Step 1. Place printer in letters A and stand printer on its backplate.

Step 2. Release print-function clutch and manually rotate mainshaft until print cam follower drops to the low of its cam. This assures that all sensing fingers have been stripped out of function slides by function bar.

Step 3. Disengage rotary detent pawl pin from the index wheel by unhooking rotary detent pawl pin spring.

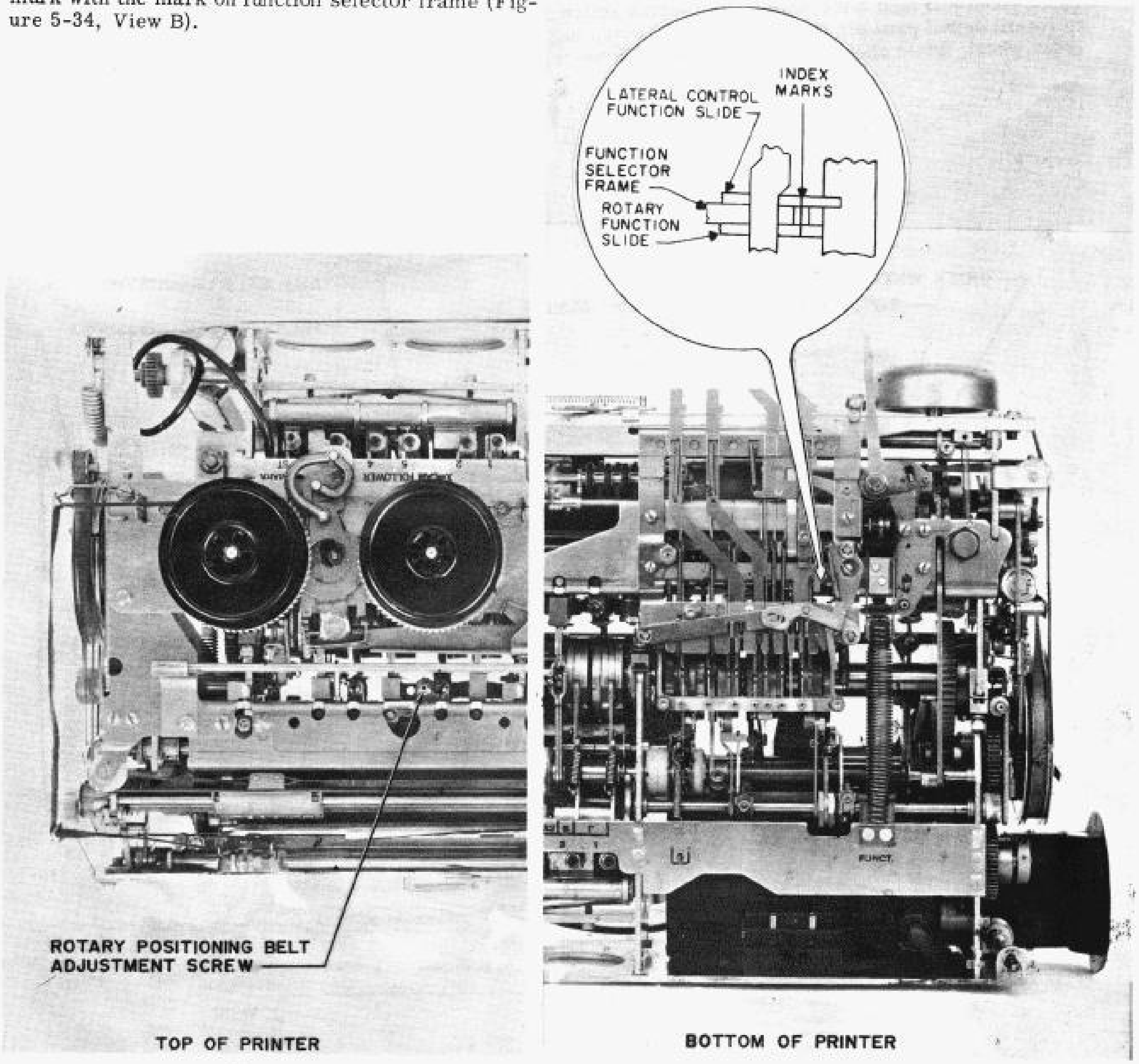
Step 4. Check alignment of rotary slide index mark with the mark on function selector frame (Figure 5-34, View B).

NOTE

If rotary function slide is properly aligned with marks on the frame, do not perform Steps 4 and 5.

Step 5. If rotary slide index mark (Figure 5-34, View B) is to the right of mark on function selector frame, shorten rotary positioning belt adjustment screw (Figure 5-34, View A) clockwise.

Step 6. If index mark (Figure 5-34, View B) on rotary function slide is on the left side of mark on function selector frame, lengthen rotary positioning belt by turning rotary slide adjustment screw (Figure 5-34, View A) counterclockwise.



View A

View B

Figure 5-34. Rotary Function Slide Adjustment

(c) ROTARY CABLE ADJUSTMENT. - Rotary cable adjustment is performed to ensure proper alignment of detent pawl pin with letter A notch in index wheel and that rotary cable is under proper tension. To check cable adjustment in normal operation continuously repeat letter A and observe index wheel for movement. If there is less than 0.010 inch movement of index wheel, cable adjustment is correct. If rotary cable adjustment (more than 0.010 inch movement of index wheel) is incorrect, perform the following adjustments:

Step 1. Place printer in letter A.

Step 2. Release print-function clutch and manually rotate mainshaft until print cam follower drops to low of its cam.

Step 3. Pull detent pawl pin away from notch in index wheel and then allow detent pawl spring action to return detent pawl pin into the marked A notch in index wheel, while checking pin alignment with the notch. If a definite movement of the index wheel is caused by detent pawl pin, proceed with Steps 5 and 6. If no movement or less than 0.010 inch movement of index wheel occurs, proceed with Step 4.

Step 4. Turn rotary cable adjustment screw (Figure 5-35) until the best possible alignment of detent pin with the notch in index wheel is attained. There should be less than 0.010 inch movement of index wheel when engaged by detent pawl pin. Manually lift and then allow detent pawl pin to return into index wheel notch a number of times, to check pin and notch alignment, and then proceed with Step 5.

Step 5. Apply power to equipment and, using repeat key, continuously repeat letter A while observing index wheel for movement.

Step 6. Readjust rotary cable adjustment screw until there is no movement or less than 0.010 inch movement of index wheel when engaged by detent pawl pin. (No movement is the optimum condition, when performing the rotary cable adjustment).

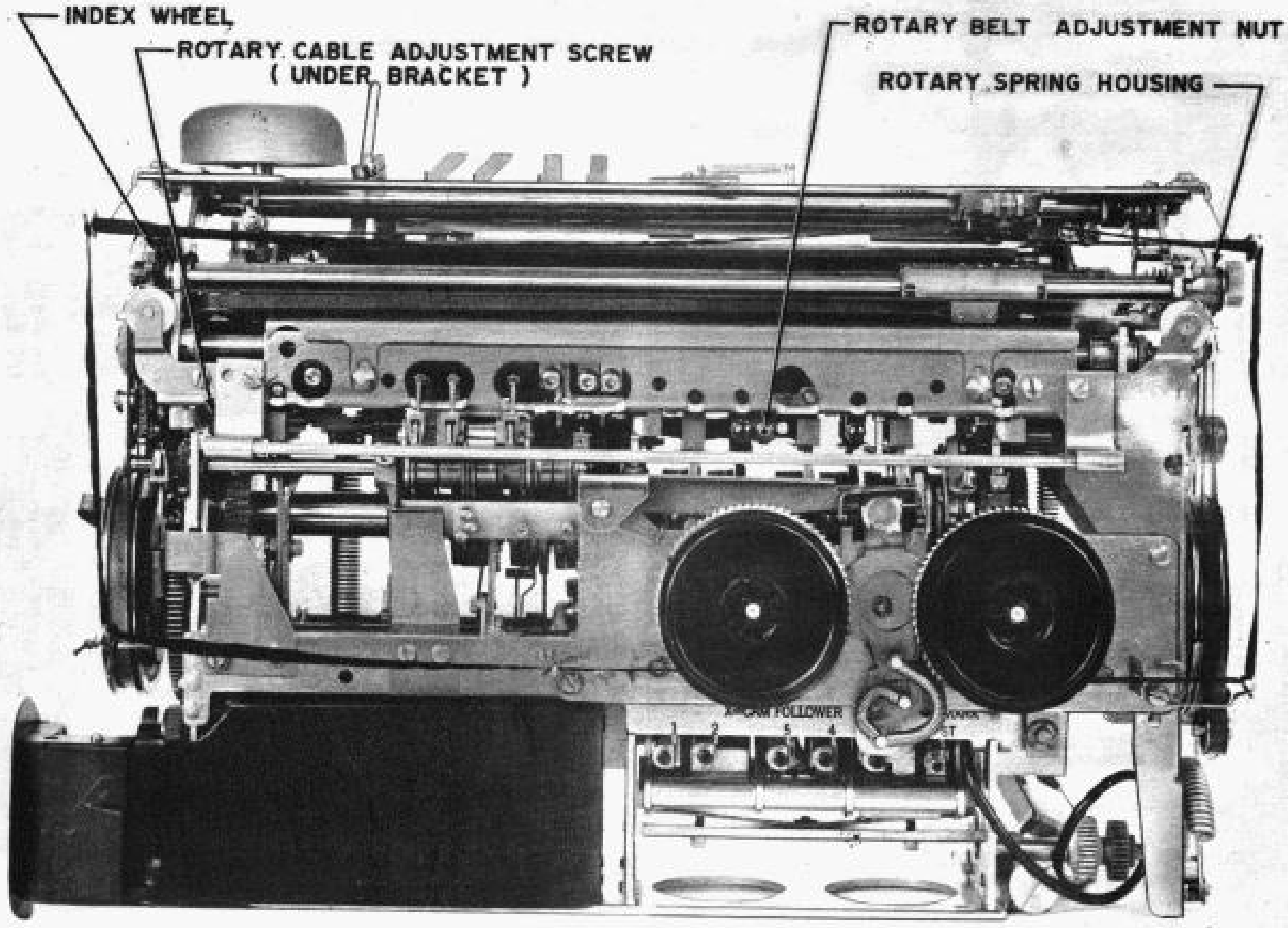

INDEX WHEEL
ROTARY CABLE ADJUSTMENT SCREW (UNDER BRACKET)
ROTARY BELT ADJUSTMENT NUT
ROTARY SPRING HOUSING
CAM FOLLOWER

Figure 5-35. Rotary Cable Adjustment

(4) LATERAL CONTROL BELT AND SLIDE ALIGNMENT ADJUSTMENTS. - Lateral control belt and lateral slide alignment adjustments are performed to ensure that the belt and slide are under proper tension from lateral takeup arm spring and that lateral slide alignment permits selection of desired functions. Adjustments can be performed separately but when one adjustment is performed the other adjustment should be checked.

(a) LATERAL CONTROL BELT ADJUSTMENT. - Ensure that lateral control belt adjustment has been performed in accordance with requirements established in Steps 1 through 3 and Step 5. If requirements are not met, perform the following adjustment sequence.

Step 1. Place printer in letters A.

Step 2. Advance print cylinder across its shaft by manually rotating advance drum (drum on right side of printer) counterclockwise until two clicks are heard or felt, indicating that end of line has been reached.

Step 3. Check for 1/16 inch clearance (when 76 character line is the format) between print cylinder yoke and print cylinder shaft bearing in the right frame, or a 1/2 inch clearance (when a 72 character line is the format) between print cylinder yoke and print cylinder shaft bearing located in the right frame.

Step 4. Loosen lateral control belt clamp screw on advance drum and adjust for a 1/16 or 1/2 inch clearance between print cylinder yoke and print shaft bearing by letting out or taking up on lateral control belt.

Step 5. Check for approximately 1/8 inch clearance between the circumference of lateral takeup arm pulley and the circumference of takeup drum. (See Figure 5-36).

Step 6. If the clearance between lateral takeup arm pulley and takeup drum circumference is not 1/8 inch, loosen belt clamp on takeup drum and let out or take up on lateral belt until 1/8 inch clearance is established. If the clearance present between lateral takeup arm pulley and takeup drum circumferences is 1/8 inch, lateral control belt is properly adjusted.

Step 7. Depress carriage return lever and after carriage return, advance type cylinder half-way across the line by manually rotating advance drum counterclockwise.

Step 8. Check alignment of hammer face with the letter A, and proceed with Steps 9 and 10 if not properly aligned.

Step 9. Loosen hammer cable clamp on advance drum, and loosen hammer cable on studs of hammer bracket. Align hammer face with letter A on print cylinder.

Step 10. Take up slack in hammer cable while holding hammer in alignment with letter A. Tighten hammer cable clamp on advance drum.

(b) LATERAL FUNCTION SLIDE ALIGNMENT ADJUSTMENT. - Ensure that lateral slide adjustment conforms with requirements established in Steps 1 and 2. If requirements are not met, perform the following adjustment procedure:

Step 1. Place printer in letters A, remove printer from chassis and stand printer on its backplate.

Step 2. Check alignment of lateral slide index mark with mark in the selector frame (Figure 5-37). If marks are aligned (see Figure 5-37), the lateral slide is adjusted properly. If marks are not aligned proceed with Step 3.

Step 3. If lateral function slide index mark is to the left of function selector frame mark, lengthen lateral positioning belt by turning lateral positioning belt adjustment screw counterclockwise.

Step 4. If lateral function slide index mark is to the right of function selector frame mark, shorten lateral positioning belt by turning lateral positioning belt adjustment screw clockwise.

Step 5. Advance type cylinder halfway across the line by manually rotating advance drum counterclockwise.

Step 6. Check alignment of the hammer face with letter A and proceed with Steps 7 and 8 if not properly aligned.

Step 7. Loosen hammer cable clamp screw on advance drum and realign the hammer face with the letter A.

NOTE

It may be necessary to loosen hammer cable twists on hammer bracket to permit alignment of hammer face with letter A.

Step 8. Tighten hammer cable clamp screw on advance drum when hammer face is properly aligned with letter A.

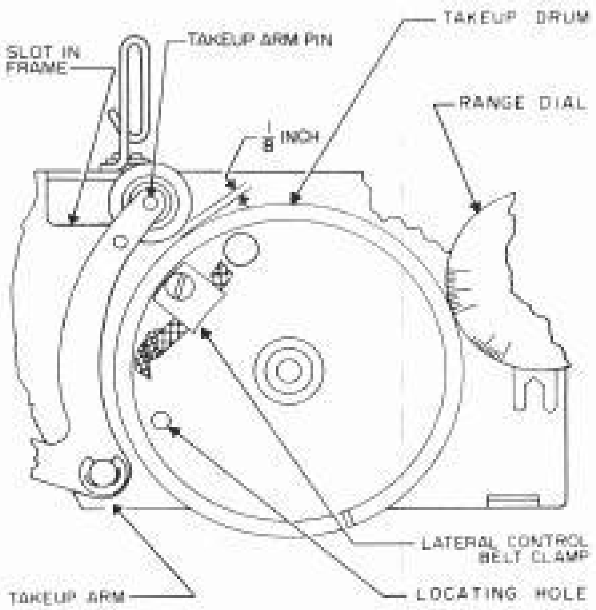


Figure 5-36. Lateral Belt Adjustment, Clearance Requirements

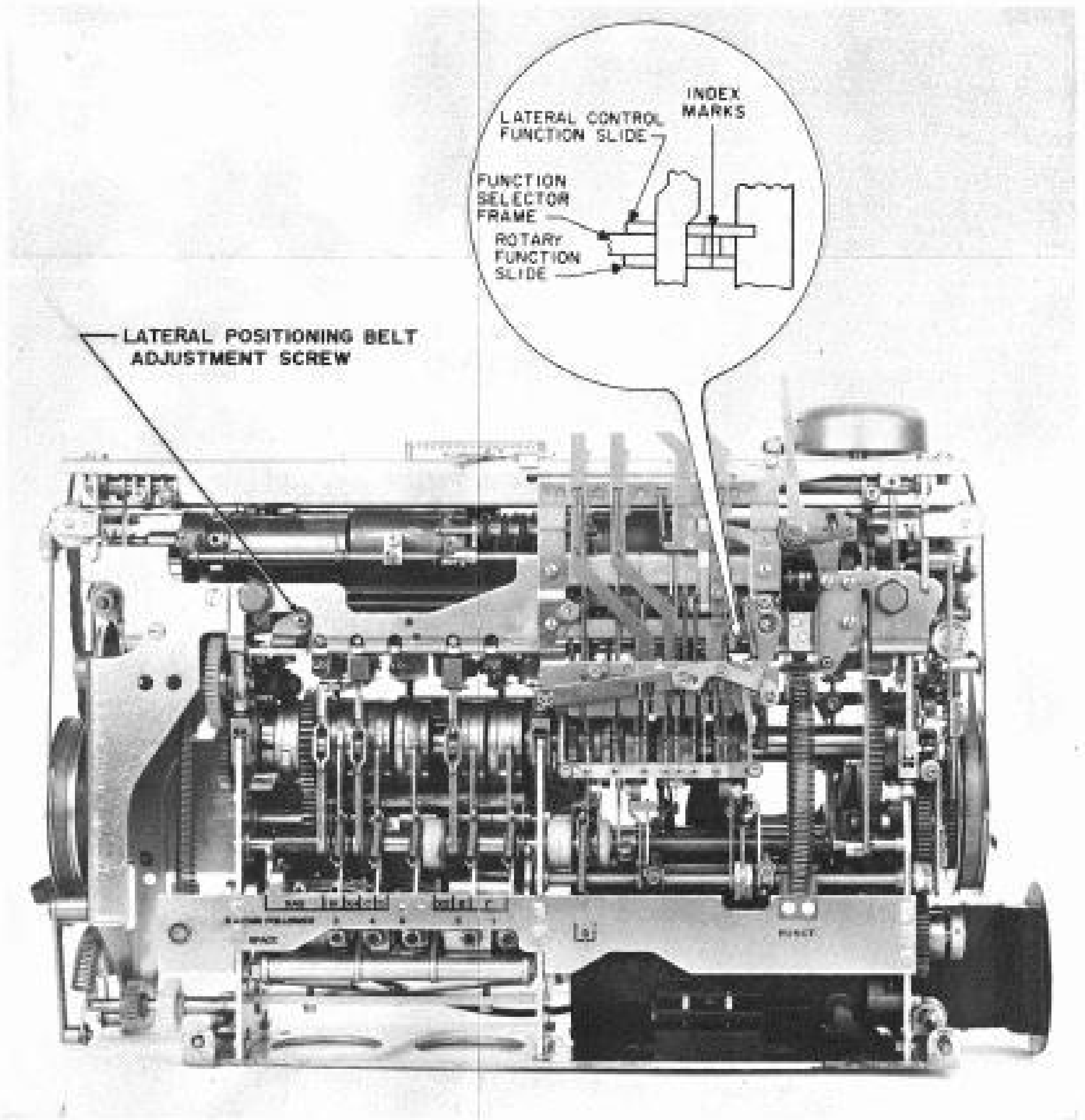

INDEX MARKS
LATERAL CONTROL FUNCTION SLIDE
FUNCTION SELECTOR FRAME
ROTARY FUNCTION SLIDE
LATERAL POSITIONING BELT ADJUSTMENT SCREW

Figure 5-37. Lateral Function Slide Adjustment

(5) START CLUTCH RELEASE ADJUSTMENT. - The start clutch release adjustment is intended to insure that start clutch will release quickly upon receipt of start signal and that it will come to rest in the same position for every stop signal. This will ensure the same angular relation to timing cam during every stop pulse and will consequently afford maximum receiving range.

Step 1. Hold start clutch release arm (10, Figure 5-38) down against clutch cage (7) and rotate mainshaft until one of the two stop tabs (9) on the clutch makes contact with release latch (2).

Step 2. While continuing to hold down start clutch release arm (10), loosen backstop clamp screw (4) and adjust backstop eccentric bushing (3) until backstop (5) is free to fall (pivot) into backstop cam restoring notch (6). Notch in the knurled eccentric bushing should be aligned approximately with the V in the backstop

NOTE

The backstop eccentric should be rotated toward the rear of the printer when adjusted.

Step 3. Tighten the backstop clamp screw (4) and release start clutch release arm.

Step 4. Try to depress start clutch release arm (10). If backstop eccentric is adjusted properly, full depression of start clutch release arm should be prevented by one of the clutch tabs which pivoted under the release latch when start clutch release arm was released in Step 3. If start clutch release arm can be depressed to permit contact of release latch with clutch cage repeat Steps 1 through 3. If release latch does not make contact with clutch cage (latch should contact tab on clutch) when start clutch release arm is depressed, proceed with Step 5.

Step 5. Rotate mainshaft while depressing start clutch release arm. Backstop should pivot sharply toward front of printer when a clutch tab makes contact with release latch indicating that backstop has been adjusted properly. If backstop pivoting action is slow, repeat Steps 1 through 4. If backstop pivoting action is sharp, proceed with Step 6.

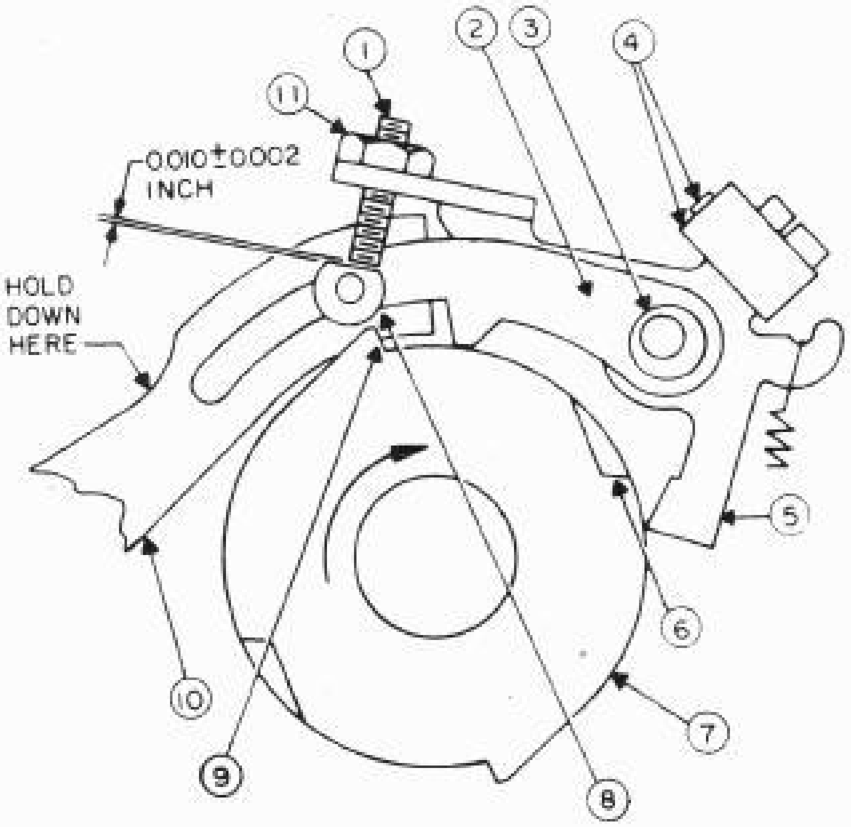
NOTE

There are two tabs on start clutch and therefore Step 5 should be repeated at least twice to ensure proper backstop pivoting action on both tabs.

Step 6. Rotate mainshaft until release latch is located approximately midway between the two stop tabs on clutch cage in order to ensure that backstop is riding on the high portion of restoring cam (tabs on clutch will be approximately horizontal).

Step 7. Loosen lock nut (11) and while depressing start clutch release arm (10), adjust start clutch adjustment screw (1) until there is a 0.010 inch clearance between the tip of screw (1) and the flat flat surface of release latch pin (8).

Step 8. Recheck for the 0.010 inch clearance while depressing start clutch release arm (10) after tightening lock nut (11).



KEY	ITEM
1	Start Clutch Adjustment Screw
2	Release Latch
3	Eccentric Bushing
4	Backstop Clamp - Backstop Clamp Screw
5	Backstop
6	Restoring Cam Notch
7	Cage
8	Release Latch Pin
9	Stop Tab
10	Start Clutch Release Arm
11	Lock Nut

Figure 5-38. Start Clutch Adjustment

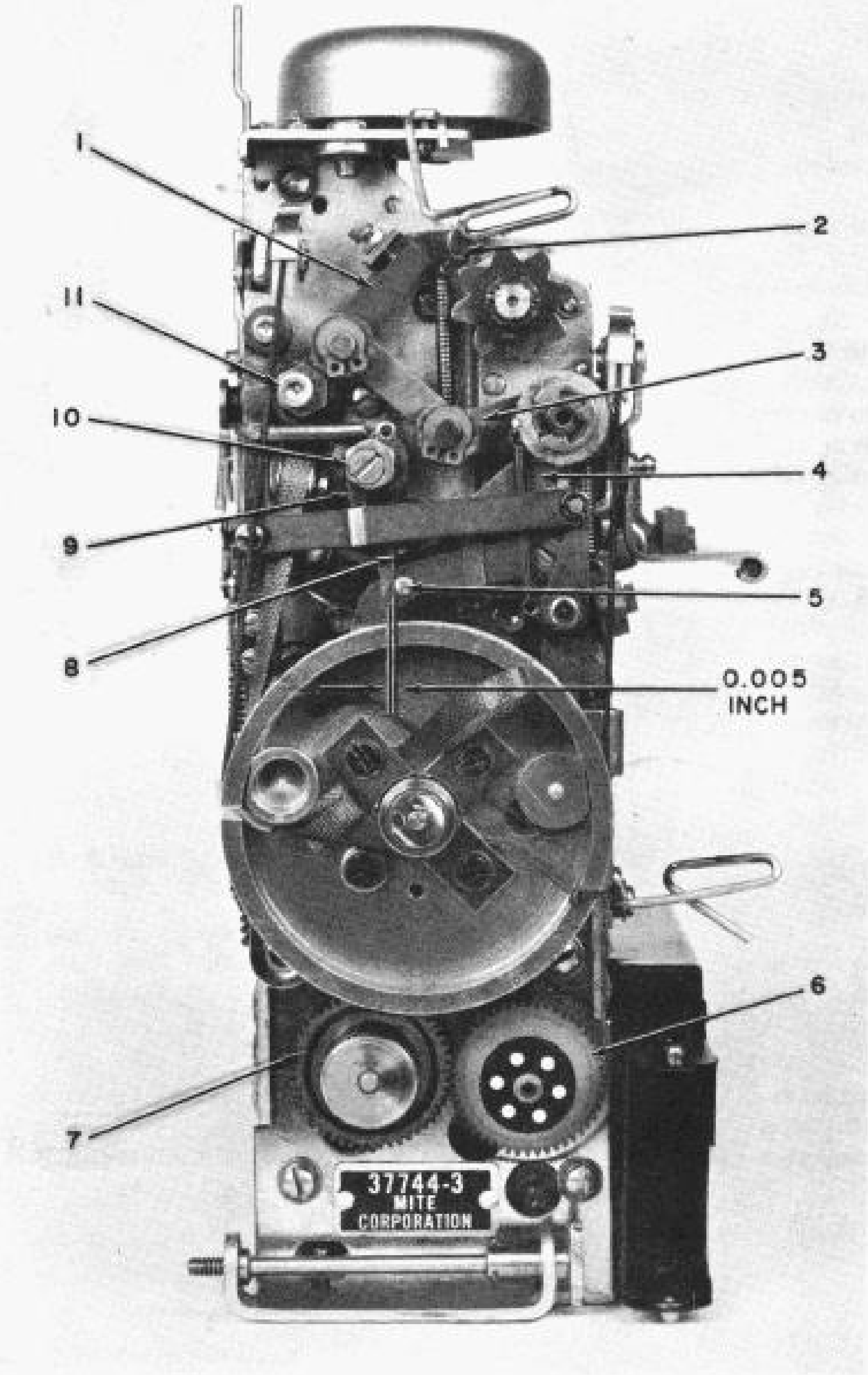
(6) FUNCTION BAR AND SHAFT ADJUSTMENT. - Prior to function bar and shaft adjustments as well as the character advance adjustments, it is advantageous to adjust the two eccentrics which are located on the right-hand side of the printer. Correct positioning of these eccentrics will save unnecessary work and confusion during later adjustments, however, further refinement of these adjustments will probably be necessary.

(a) PRELIMINARY SETTING OF ECCENTRICS ON RIGHT SIDE OF PRINTER.

Step 1. Stand printer on its backplate and turn it so the right side is facing you.

Step 2. Set the heavy portion of ADVANCE PREVENTION eccentric (10, Figure 5-39) at about 3:00 o'clock.

Step 3. Set the heavy portion of DETENT ARM eccentric (11) at about 5:00 o'clock, which will make it perpendicular to lifter arm, (1).



KEY	ITEM
1	Rotary Detent Actuator
2	Rotary Detent Pawl Pin
3	Function Shaft Terminal Lever
4	Advance Prevention Lever
5	Advance Feed Pawl Pin
6	Speed Change Gear
7	Idler Gear
8	Contact Point (Advance Prevention Lever and Latch)
9	Advance Prevention Latch
10	Advance Prevention Eccentric
11	Detent Arm Eccentric

Figure 5-39. Right Side - Printer

(b) FUNCTION BAR ADJUSTMENT. - The function bar adjustment ensures that the function bar actuates only the sensing finger for the function which is to be selected and deflects the rest of the sensing fingers.

NOTE

Check that function bar performs in accordance with the requirements established in Steps 1 through 3. If the requirements are not met, perform the following adjustment sequence.

Step 1. Place printer in letter A, remove printer from chassis, and place printer on its backplate.
Step 2. Release print-function clutch and rotate mainshaft until function cam follower drops to the low of its cam.
Step 3. Raise and lower function spring yoke a number of times and check point of contact of function bar (Figure 5-40) with blank sensing finger (sensing finger on the extreme left) and carriage return sensing finger (sensing finger on the extreme right).

NOTE

The point of contact by the function bar should be 1/3 to 1/2 of the way down the angled surface on both sensing fingers (Figure 5-40). Both sensing fingers should be deflected by function bar toward the bottom of the printer (not to the rear).

(c) FUNCTION SHAFT ADJUSTMENT. - The purpose of this adjustment is to establish the correct angular relationship between function lever and bar assembly and function cam follower (Figure 5-41).

NOTE

Check that function shaft adjustment is in compliance with requirements established in Step 13. If requirements are not met, perform the following adjustment sequence.

Step 1. Loosen function cam follower clamp screw (Figure 5-42) and function bar lifter arm clamp screw.
Step 2. Stand printer on its backplate, with the (space side) bottom facing you.
Step 3. Place allen wrench in function cam follower screw (Figure 5-42) and using it as a lever, hold cam follower down on function cam by holding upward pressure on wrench.
Step 4. Maintain this pressure, release function clutch, and rotate mainshaft until cam follower falls to the low portion of function cam.

NOTE

Observe that allen wrench was forced downward and when the low portion of cam was reached, it popped upward.

Step 5. Engage tab on advance prevention lever all the way into step on advance prevent latch (Figure 5-39) at point (8).

NOTE

Observe that pin on the advance pawl (5) is touching advance prevention latch (9).

Step 6. Apply downward pressure on function shaft terminal at point (3), until pin on the advance feed pawl (5) has some, but not more than 0.005 inch clearance between it and advance prevention latch (9). While maintaining this clearance, check that function cam follower is laterally aligned with and is on the low side of cam.
Step 7. Tighten the function cam follower clamp screw.
Step 8. Rotate mainshaft until function cam follower is on the high portion of function cam.

NOTE

Clutch will come to stop position and will have to be manually released before it will go to high position.

Step 9. Place hex head wrench in lifter arm clamp screw (Figure 5-43).
Step 10. Insert a screwdriver through function spring yoke until screwdriver tip is positioned under lifter arm. (Check that the lifter arm is in the slot in function lever assembly).
Step 11. Using a screwdriver as a lever, pivot the screwdriver on shock pad located on printer frame to move lifter arm, function lever assembly and function bar until a clearance of 0.030 of an inch between function bar and sensing finger tips is established.

NOTE

It is possible to shift function section laterally to the right or left to center the spring yoke assembly on the shock pad prior to tightening lifter arm.

Step 12. Tighten lifter arm clamp screw, maintaining 0.030 inch clearance between function bar and sensing finger tips.

NOTE

Depress function terminal lever or check that function cam follower is riding on its cam when establishing the 0.030 inch clearance.

Step 13. Release print-function clutch and rotate mainshaft until function cam follower rises to the high of its cam and that the function bar clears the sensing fingers by approximately 0.030 inch.

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Step 5. Engage tab on advance prevention lever all the way into step on advance prevent latch (Figure 5-39) at point (8).

NOTE

Observe that pin on the advance pawl (5) is touching advance prevention latch (9).

Step 6. Apply downward pressure on function shaft terminal at point (3), until pin on the advance feed pawl (5) has some, but not more than 0.005 inch clearance between it and advance prevention latch (9). While maintaining this clearance, check that function cam follower is laterally aligned with and is on the low side of cam.

Step 7. Tighten the function cam follower clamp screw.

Step 8. Rotate mainshaft until function cam follower is on the high portion of function cam.

NOTE

Clutch will come to stop position and will have to be manually released before it will go to high position.

Step 9. Place hex head wrench in lifter arm clamp screw (Figure 5-43).

Step 10. Insert a screwdriver through function spring yoke until screwdriver tip is positioned under lifter arm. (Check that the lifter arm is in the slot in function lever assembly).

Step 11. Using a screwdriver as a lever, pivot the screwdriver on shock pad located on printer frame to move lifter arm, function lever assembly and function bar until a clearance of 0.030 of an inch between function bar and sensing finger tips is established.

NOTE

It is possible to shift function section laterally to the right or left to center the spring yoke assembly on the shock pad prior to tightening lifter arm.

Step 12. Tighten lifter arm clamp screw, maintaining 0.030 inch clearance between function bar and sensing finger tips.

NOTE

Depress function terminal lever or check that function cam follower is riding on its cam when establishing the 0.030 inch clearance.

Step 13. Release print-function clutch and rotate mainshaft until function cam follower rises to the high of its cam and that the function bar clears the sensing fingers by approximately 0.030 inch.

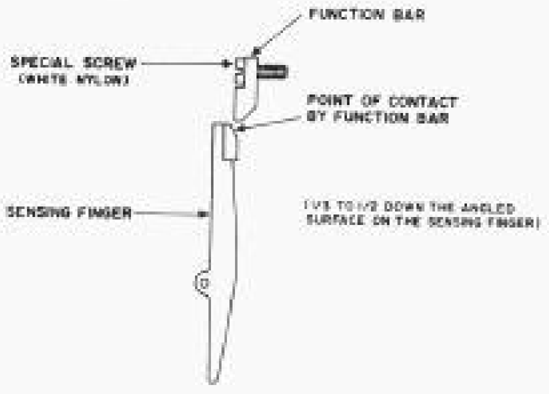

FUNCTION BAR
SPECIAL SCREW (WHITE NYLON)
POINT OF CONTACT BY FUNCTION BAR
SENSING FINGER
(1/3 TO 1/2 DOWN THE ANGLED SURFACE ON THE SENSING FINGER)

Figure 5-40. Function Bar Adjustment

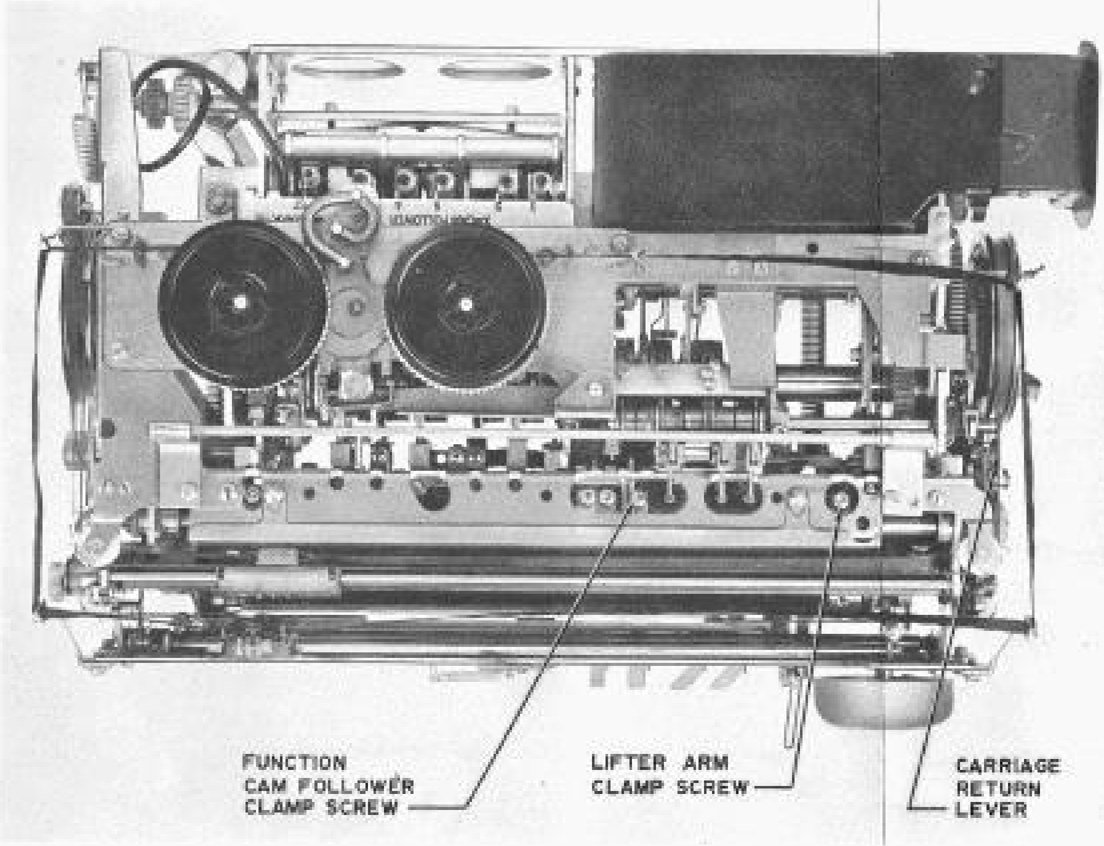


Figure 5-41. Function Shaft Adjustment (Screw Location)

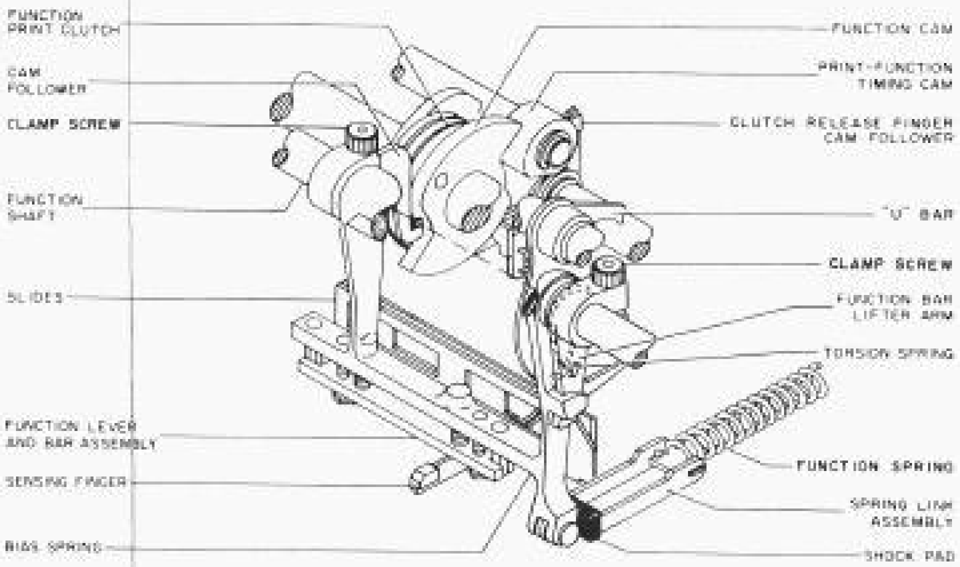
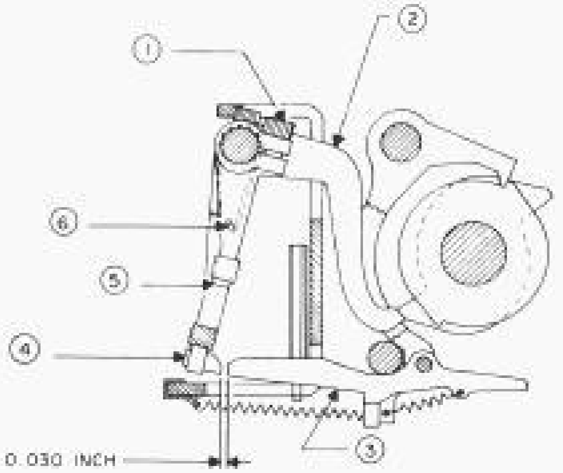


Figure 5-42. Function Selector, Start of Function Cycle



KEY	ITEM
1	Lifter Arm Clamp Screw
2	Function Cam Follower at High Point of Cam
3	Sensing Finger
4	Function Bar
5	Lifter Arm
6	Torsion Spring

Figure 5-43. Function Shaft Adjustment

(7) ROTARY DETENT ADJUSTMENT. - Rotary detent pawl adjustment ensures that during rotary selection, (rotation of the index wheel), rotary detent pawl pin clears the tips of the index wheel by at least 0.010 inch.

Step 1. Release print function clutch and rotate mainshaft until it comes to stop position.

Step 2. Loosen locknut (4, Figure 5-44).

Step 3. Adjust rotary detent screw (5) until 0.010 inch clearance (1) is established between the tip of rotary detent pawl pin (6) and the tips of index wheel (2).

Step 4. Tighten locknut (4).

Step 5. Rotate the mainshaft until the function cam follower drops to low of its cam.

Step 6. Check for approximately 0.030 inch clearance between the rotary detent screw (5) and actuator (3).

Step 7. Repeat Steps 2 through 4, if 0.030 inch clearance is not present between rotary detent screw (5) and actuator (3) with function cam follower on low of its cam.

Step 8. Rotate mainshaft until print function clutch comes to stop position and recheck for 0.010 inch clearance (1) between detent pawl pin (6) and index wheel (2) tips.

NOTE

> Manually rotate index wheel to be certain that 0.010 inch clearance exists between the tip of the index wheel and the detent pawl pin.

(8) CHARACTER ADVANCE ADJUSTMENT. - The character advance adjustment establishes correct relationship between advance feed pawl, check pawl, and the function cam follower. When correct relationship has been established, each down stroke of function cam follower will result in one tooth being fed on advance drum ratchet, except when advance is intentionally suppressed.

NOTE

> Check that character advance adjustment is in compliance with the requirements established in Notes after Steps 4 and 8. If requirements are not met, perform the following adjustment sequence.

Step 1. Release print function clutch and rotate the mainshaft until the function cam follower rises to the high of the cam.

Step 2. Slowly rotate advance drum (1, Figure 5-45) and check for a 1/4 tooth clearance between advance check pawl and engaged tooth of advance ratchet.

NOTE

> When advance feed pawl (2) falls into a tooth in advance ratchet (3) there should be a 1/4 tooth clearance between tip of advance check pawl (4) and engaged tooth on advance ratchet (3) at point (5).

Step 3. If the 1/4 tooth clearance (5) between advance check pawl (4) and engaged tooth of advance ratchet (3) is not present after performing Steps 1 and 2, loosen two screws securing advance check pawl tip to advance pawl (4) main body.

Step 4. Adjust advance check pawl tip until 1/4 tooth clearance is established between tip of advance check pawl (4) and engaged tooth of advance ratchet (3).

Step 5. Turn advance drum (1) counterclockwise for five or six teeth to check action of advance feed pawl (2) and advance check pawl (4).

NOTE

> With function cam follower on the high of the cam, counterclockwise rotation of advance drum should result first in advance check pawl and then advance feed pawl falling into a tooth in advance ratchet.

Step 6. Rotate mainshaft until function cam follower drops to the low of the cam.

Step 7. Slowly rotate advance drum (1, Figure 5-46) counterclockwise until both advance check pawl (3) and advance feed pawl (5) fall into teeth in advance ratchet (2).

Step 8. Turn advance drum counterclockwise for five or six teeth and check eccentric setting.

NOTE

> With function cam follower on the low of the cam, counterclockwise rotation of advance drum should first result in advance feed pawl and then advance check pawl falling into a tooth in advance ratchet.

Step 9. If necessary readjust advance check pawl clearance to establish 1/4 tooth clearance between tip of feed pawl (5) and engaged tooth of advance ratchet by loosening the two screws in advance check pawl (3) and adjusting length of advance check pawl.

Step 10. If check pawl length was readjusted in Step 9, place function cam follower on the high of its cam and recheck for 1/4 tooth clearance (5, Figure 5-45) between tip of advance check pawl and engaged tooth (5) of advance ratchet (3).

(7) ROTARY DETENT ADJUSTMENT. - Rotary detent pawl adjustment ensures that during rotary selection, (rotation of the index wheel), rotary detent pawl pin clears the tips of the index wheel by at least 0.010 inch.

Step 1. Release print function clutch and rotate mainshaft until it comes to stop position.

Step 2. Loosen locknut (4, Figure 5-44).

Step 3. Adjust rotary detent screw (5) until 0.010 inch clearance (1) is established between the tip of rotary detent pawl pin (6) and the tips of index wheel (2).

Step 4. Tighten locknut (4).

Step 5. Rotate the mainshaft until the function cam follower drops to low of its cam.

Step 6. Check for approximately 0.030 inch clearance between the rotary detent screw (5) and actuator (3).

Step 7. Repeat Steps 2 through 4, if 0.030 inch clearance is not present between rotary detent screw (5) and actuator (3) with function cam follower on low of its cam.

Step 8. Rotate mainshaft until print function clutch comes to stop position and recheck for 0.010 inch clearance (1) between detent pawl pin (6) and index wheel (2) tips.

NOTE

> Manually rotate index wheel to be certain that 0.010 inch clearance exists between the tip of the index wheel and the detent pawl pin.

(8) CHARACTER ADVANCE ADJUSTMENT. - The character advance adjustment establishes correct relationship between advance feed pawl, check pawl, and the function cam follower. When correct relationship has been established, each down stroke of function cam follower will result in one tooth being fed on advance drum ratchet, except when advance is intentionally suppressed.

NOTE

> Check that character advance adjustment is in compliance with the requirements established in Notes after Steps 4 and 8. If requirements are not met, perform the following adjustment sequence.

Step 1. Release print function clutch and rotate the mainshaft until the function cam follower rises to the high of the cam.

Step 2. Slowly rotate advance drum (1, Figure 5-45) and check for a 1/4 tooth clearance between advance check pawl and engaged tooth of advance ratchet.

NOTE

> When advance feed pawl (2) falls into a tooth in advance ratchet (3) there should be a 1/4 tooth clearance between tip of advance check pawl (4) and engaged tooth on advance ratchet (3) at point (5).

Step 3. If the 1/4 tooth clearance (5) between advance check pawl (4) and engaged tooth of advance ratchet (3) is not present after performing Steps 1 and 2, loosen two screws securing advance check pawl tip to advance pawl (4) main body.

Step 4. Adjust advance check pawl tip until 1/4 tooth clearance is established between tip of advance check pawl (4) and engaged tooth of advance ratchet (3).

Step 5. Turn advance drum (1) counterclockwise for five or six teeth to check action of advance feed pawl (2) and advance check pawl (4).

NOTE

> With function cam follower on the high of the cam, counterclockwise rotation of advance drum should result first in advance check pawl and then advance feed pawl falling into a tooth in advance ratchet.

Step 6. Rotate mainshaft until function cam follower drops to the low of the cam.

Step 7. Slowly rotate advance drum (1, Figure 5-46) counterclockwise until both advance check pawl (3) and advance feed pawl (5) fall into teeth in advance ratchet (2).

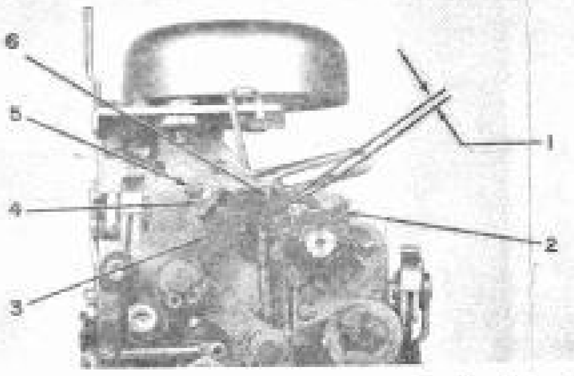
Step 8. Turn advance drum counterclockwise for five or six teeth and check eccentric setting.

NOTE

> With function cam follower on the low of the cam, counterclockwise rotation of advance drum should first result in advance feed pawl and then advance check pawl falling into a tooth in advance ratchet.

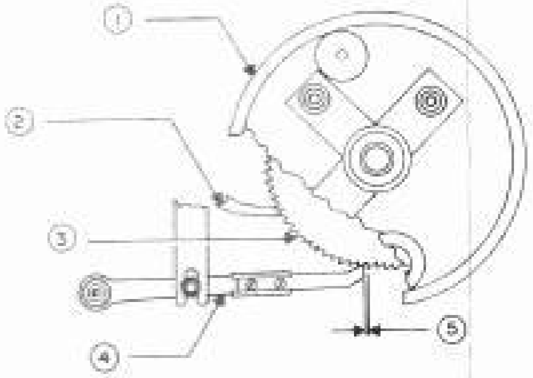
Step 9. If necessary readjust advance check pawl clearance to establish 1/4 tooth clearance between tip of feed pawl (5) and engaged tooth of advance ratchet by loosening the two screws in advance check pawl (3) and adjusting length of advance check pawl.

Step 10. If check pawl length was readjusted in Step 9, place function cam follower on the high of its cam and recheck for 1/4 tooth clearance (5, Figure 5-45) between tip of advance check pawl and engaged tooth (5) of advance ratchet (3).



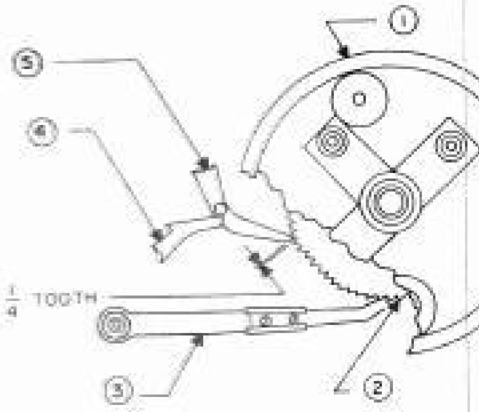
KEY	ITEM
1	Clearance Location
2	Index Wheel
3	Actuator
4	Locknut
5	Adjustment Screw
6	Rotary Detent Pawl Pin

Figure 5-44. Rotary Detent Mechanism



KEY	ITEM
1	Advance Drum
2	Advance Feed Pawl
3	Advance Ratchet
4	Advance Check Pawl
5	1/4 Tooth Clearance

Figure 5-45. Character Advance Adjustment



KEY	ITEM
1	Advance Drum
2	Advance Ratchet
3	Advance Check Pawl
4	Advance Prevention Catch
5	Advance Feed Pawl

Figure 5-46. Character Advance Adjustment

(9) CARRIAGE RETURN ADJUSTMENTS. - The following adjustments are intended to put carriage return lock lever and carriage return lock lever disconnect arm in proper relationship to one another and to carriage return cam follower. This ensures that carriage return cam follower will be: (a) held out and away from cam until full carriage return has taken place; and (b) released to fall onto its cam as soon as carriage return has taken place.

NOTE

> Check clearance established in Steps 8 and 9 prior to performing following adjustment.

Step 1. Adjust first character adjustment screw (4, Figure 5-47, View A) in the V-lever (2) so that it protrudes about 1/8 inch at point (3).

Step 2. Back out the five screws on the advance prevention bail (10, Figure 5-47, View B) so they do not project below the bail.

Step 3. Check to make sure that pin (12) on carriage return cam follower (11) is in the advance prevent bail (10).

Step 4. With carriage return clutch in stop position, (low position) loosen clamp screw (9) and align cam follower (11) laterally with cam (1), using a wrench in the cam follower clamp screw (9) to move the cam.

Step 5. Using slight pressure with the wrench, simultaneously hold cam follower against cam and push down on carriage return lever (3).

Step 6. Release latch (8, Figure 5-48) and hold down on carriage return lever (3, Figure 5-47, View B) to set a 1/32 inch clearance between surface of advance feed pawl (1, Figure 5-48) and inner surface of tab on advance prevention lever (9).

Step 7. When 1/32 inch clearance is obtained, tighten carriage return cam follower clamp screw (9, Figure 5-47, View B).

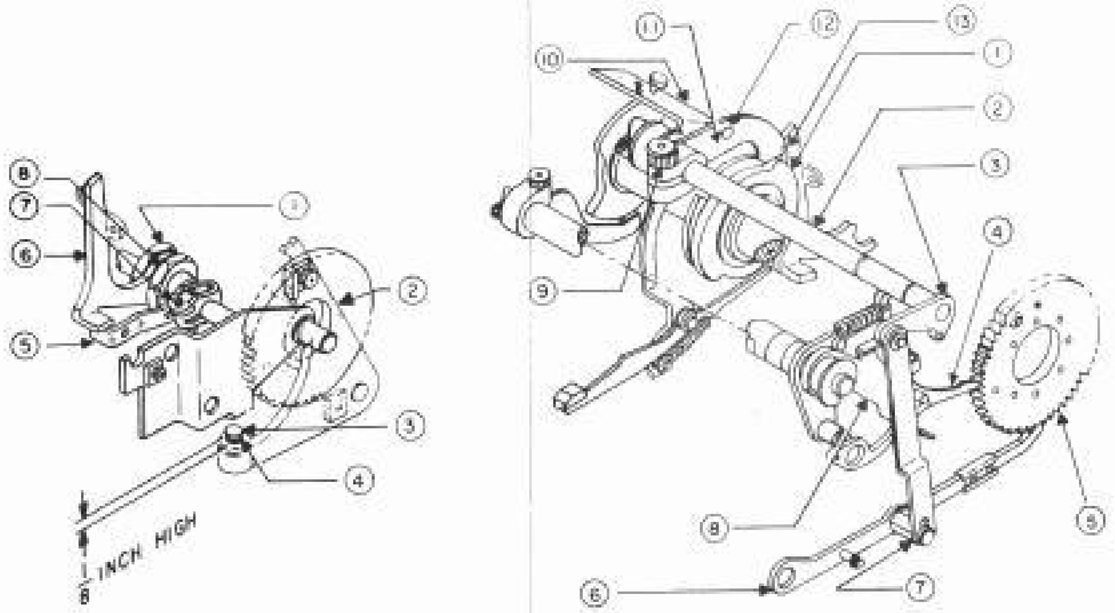
Step 8. Rotate carriage return clutch until cam follower (11) is located on high portion of cam. This is best accomplished by pushing down on the off-line carriage return slide lever and rotating the mainshaft.

Step 9. Engage check pawl link (6, Figure 5-48) in check pawl eccentric (5) on advance check pawl (7). Check for 1/16 to 3/32 inch clearance between tip of check pawl (7) and teeth on advance ratchet (4) at point (3). Adjust this clearance by rotating check pawl eccentric (5) on advance check pawl (7) either clockwise or counterclockwise.

Step 10. Turn mainshaft until carriage return clutch comes to the stop position.

NOTE

> Carriage return lock lever (6, Figure 5-47, View A) may have to be pushed down to allow cam follower to ride on cam to get the clutch to stop.



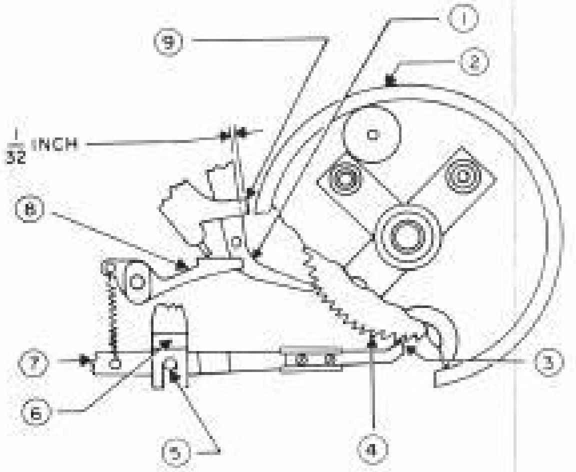
VIEW A

KEY	ITEM
1	Carriage Return Lock Lever Eccentric
2	V Lever
3	Point 3
4	First Character Adjustment Screw
5	Lock Lever Disconnect Arm
6	Carriage Return Lock Lever
7	Lock Lever Disconnect Arm Screw
8	Lock Lever Locknut

VIEW B

KEY	ITEM
1	Carriage Return Cam
2	Carriage Return Shaft
3	Carriage Return Lever
4	Advance Feed Pawl
5	Advance Ratchet
6	Advance Check Pawl
7	Check Pawl Link
8	Advance Prevention Lever
9	Cam Follower Clamp Screw
10	Advance Prevent Bail
11	Carriage Return Cam Follower
12	Pin on Carriage Return Cam Follower
13	Carriage Return Lock Lever

Figure 5-47. Carriage Return Linkage



KEY	ITEM
1	Advance Feed Pawl
2	Advance Drum
3	Point
4	Advance Ratchet
5	Check Pawl Link Eccentric
6	Check Pawl Link
7	Advance Check Pawl
8	Latch
9	Advance Prevention Lever

Figure 5-48. Carriage Return Lever Adjustment

(a) CARRIAGE RETURN AND LOCK LEVER ADJUSTMENT. - This adjustment ensures that full carriage return occurs with both the type cylinder and print hammer moving to the left hand margin.

NOTE

Check that carriage return and lock lever adjustment is correct (refer to Step 9). If adjustment is incorrect, perform the following adjustments sequence.

Step 1. Depress carriage return off-line function slide and rotate mainshaft until carriage return cam follower (6, Figure 5-49) is on the high of its cam.

Step 2. With carriage return cam follower still on the high of its cam (full return carriage has occurred) slightly loosen lock lever disconnect arm screw (7, Figure 5-47, View A) so that it may be moved on its shaft and yet remain in position after each movement.

Step 3. Loosen hex-headed locknut (8, Figure 5-47, View A) using two special wrenches provided in MITE Corporation Tool Kit.

Step 4. Adjust lock lever eccentric bushing (2, Figure 5-49) until a 0.010 inch clearance (1) is established between the notch in the carriage return cam follower and the lock lever tip.

Step 5. Tighten hex-headed locknut (hold the eccentric when tightening locknut) when 0.010 clearance is established.

Step 6. With carriage return cam follower still on the high of the cam, manually position lock lever to obtain 1/32 inch clearance (move the lock lever disconnect arm to position lock lever) as shown in Figure 5-50.

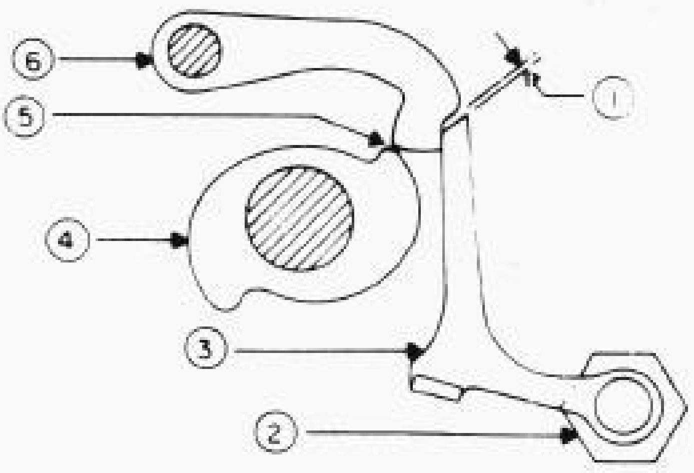
Step 7. Tighten lock lever disconnect arm screw when clearance is correct.

Step 8. Rotate mainshaft until carriage return clutch comes to stop position and advance printer cylinder halfway across the line by manually rotating advance drum counterclockwise.

Step 9. Check carriage return adjustment by depressing carriage return off-line function slide while rotating mainshaft until carriage return occurs.

NOTE

Manual carriage return can be effected by using index finger to depress carriage return lever (3, Figure 5-47, View B) and thumb to push in on first character adjustment screw (4, Figure 5-47, View A).



KEY	ITEM
1	0.010 inch Clearance
2	Carriage Return Lock Lever Eccentric
3	Carriage Return Lock Lever
4	Carriage Return Cam
5	Cam Follower on High of Cam
6	Carriage Return Cam Follower

Figure 5-49. Carriage Return Lock Lever Adjustment (Eccentric Bushing)

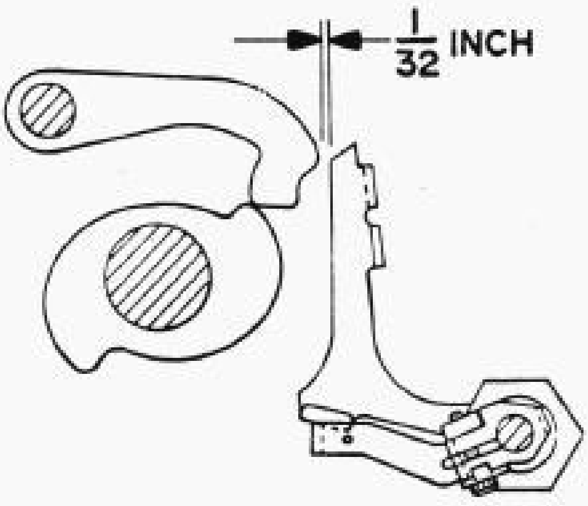


Figure 5-50. Carriage Return Lock Lever Adjustment (Disconnect Arm Screw)

(b) AUTOMATIC CARRIAGE RETURN AND LINE FEED ADJUSTMENT. - The automatic carriage return and line feed adjustment ensures that automatic carriage return and line feed take place after printing of the 72nd or 76th character, as desired.

NOTE

> Check that automatic carriage return and line feed adjustment is in compliance with requirements established in Steps 8 through 11. If requirements are not met, perform the following sequence.

Step 1. Rotate mainshaft and depress off-line carriage return function slide until carriage return occurs.

Step 2. Advance print cylinder across line to its midpoint of travel by rotating advance drum counterclockwise.

Step 3. Gently pull outward on automatic carriage return and line feed actuator (4, Figure 5-51) and observe that both sides of actuator (4) strike automatic carriage return (1) and line feed (6) sensing fingers simultaneously.

Step 4. If simultaneous contact is not made, adjust automatic carriage return eccentric (2).

Step 5. Loosen actuator arm screw (3) to permit movement of arm on its shaft.

Step 6. Using the actuator arm as a lever, set sensing fingers (6 and 1) midway between function bar (1, Figure 5-52) and stop strip (3) approximately 1/32 inch at points (4) and tighten actuator arm screw.

Step 7. Rotate advance drum counterclockwise until stop pin comes in contact with V-lever and two clicks are heard or felt. (This indicates that the end of line has been reached).

Step 8. Pull outward on function clutch release (5, Figure 5-51) to release the function clutch while rotating the mainshaft.

Step 9. Rotate mainshaft until function cam follower moves to the high of its cam.

NOTE

> The two automatic sensing fingers (6 and 1, Figure 5-51) should fall under the function bar (1, Figure 5-52).

Step 10. Repeat steps 1 through 6 if both sensing fingers do not fall under function bar. If sensing fingers do fall under the function bar proceed with Step 11.

Step 11. Rotate mainshaft and observe that the motion of function bar pushes line feed and carriage return fingers to rear of printer, the motion of fingers released their respective clutches, and line feed and carriage return functions are performed.

(10) LINE FEED ON CARRIAGE RETURN ADJUSTMENT.

Step 1. Loosen screw (1, Figure 5-53).

Step 2. Adjust eccentric (2) until a maximum clearance of 0.005-inches is established between line feed lever (3) and line feed clutch release arm (4).

NOTE

> Latch (9) should also be in position under carriage return clutch release arm (10). Cancellation spring (7) must be positioned on right tab of cancellation lever (8) in order that line feed on carriage return mechanism be operational.

Step 3. Tighten screw (1) when conditions in Step 2 have been obtained.

Step 4. Loosen nut (5).

Step 5. Adjust slide (6) so that when manual off-line carriage return lever is actuated, cancellation lever moves latch (9) out from under carriage return clutch release arm (10). Selection of manual off-line carriage return should now be permitted without actuation of line feed clutch release arm (10).

Step 6. Tighten nut (5) when conditions in Step 5 have been obtained.

(11) DISABLING LINE FEED ON CARRIAGE RETURN MECHANISM.

Step 1. Hook cancellation spring (7, Figure 5-53) to cancellation lever (8) eyelet on left of its pivot point. Latch (9) is then held out from under carriage return clutch release arm (10), thus disabling line feed on carriage return mechanism.

(12) BELL SENSING FINGER ADJUSTMENT. - Check that bell sensing finger adjustment is in compliance with the requirements established in Steps 5 and 6. If requirements are not met, perform the following adjustment sequence.

Step 1. Remove two screws and advance prevent stop spring from frame (spring rides on advance prevent bail and are located directly opposite motor housing).

Step 2. Remove printer from chassis and stand printer on its backplate.

Step 3. Place printer in by releasing print-function clutch, depressing letters clutch release arm (6, Figure 5-54), and rotate mainshaft.

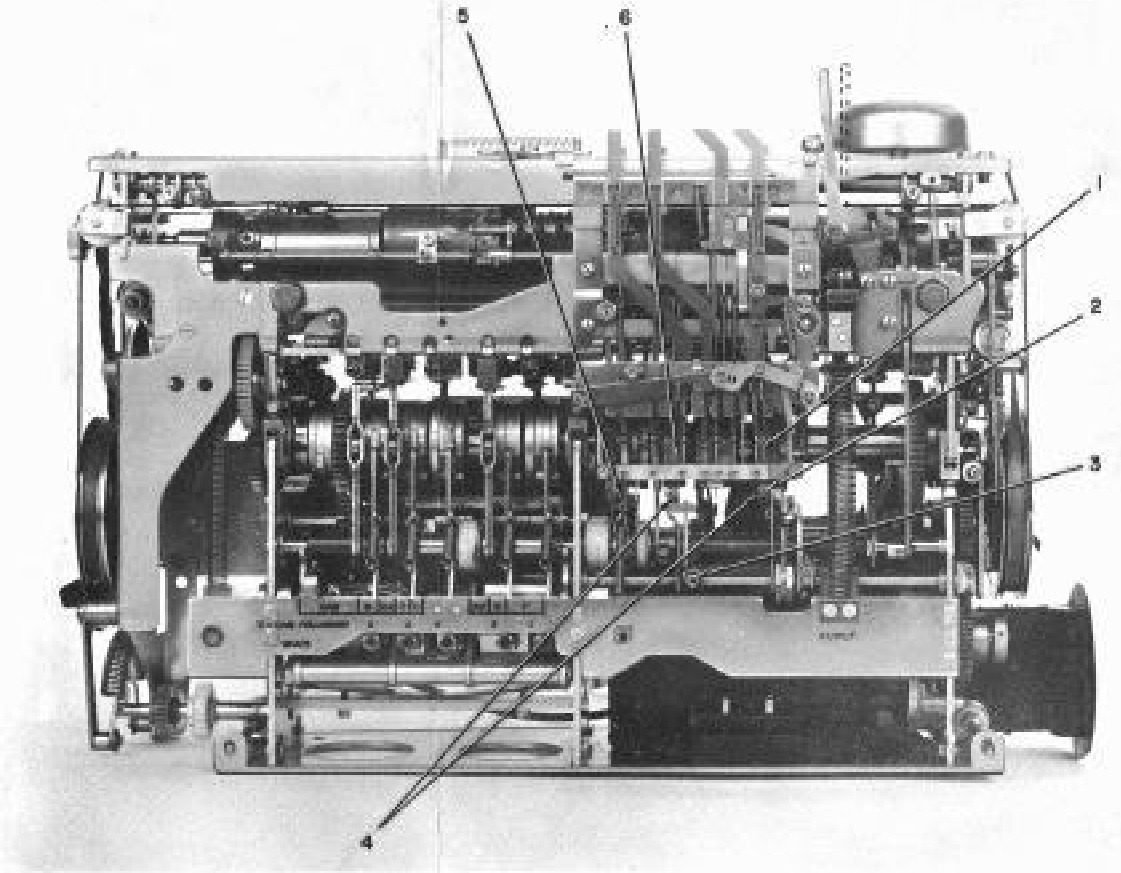
Step 4. Continue to rotate mainshaft until the shift to letters is accomplished and letters-figures clutch stops rotating.

Step 5. Loosen bell prevent lever clamp screw (2), adjust lever (4) to hold bell sensing finger (3) 1/32 inch away from the face of function bar (6); tighten clamp screw (2).

Step 6. Place printer in figures position by releasing function clutch and rotating mainshaft while depressing figures off-line function slide.

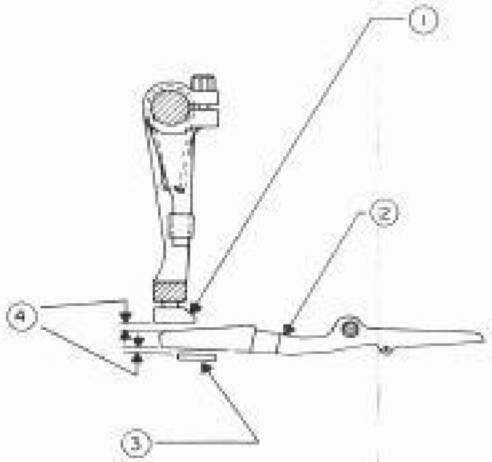
Step 7. Check that bell prevent lever tab (5) is clear of bell sensing finger (3) allowing finger to fall into the aligned slots in lateral and rotary slides (8) when bell function is selected.

Step 8. Replace advance prevent bail spring, securing spring with two screws that were removed in Step 4.



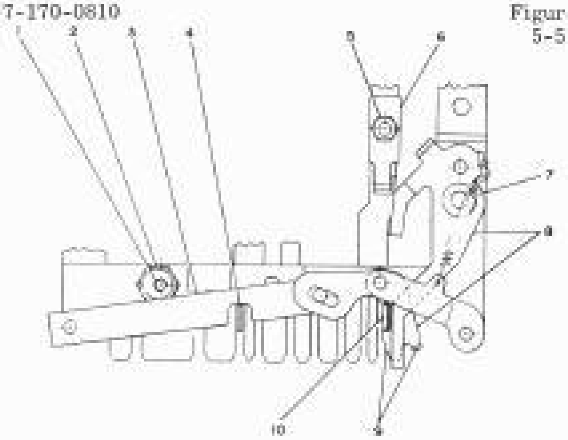
KEY	ITEM
1	Automatic Carriage Return Sensing Finger
2	Automatic Carriage Return Eccentric
3	Actuator Arm Screw
4	Carriage Return/Line Feed Actuators
5	Function Clutch Release Finger
6	Line Feed Sensing Finger

Figure 5-51. Automatic Carriage Return and Line Feed Adjustment



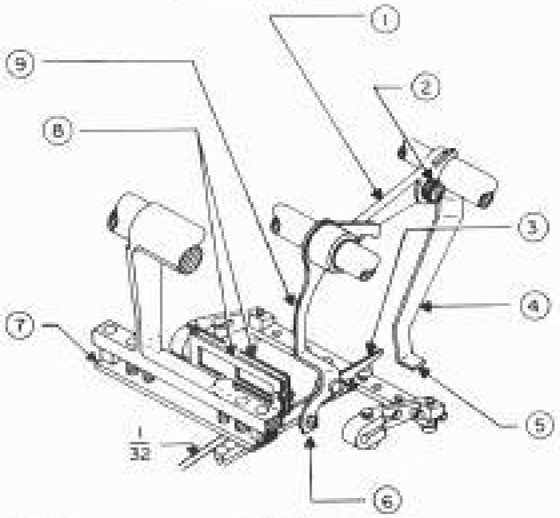
KEY	ITEM
1	Function Bar
2	Sensing Finger
3	Stop Strip
4	1/32 inch Clearances

Figure 5-52. Function Bar and Sensing Finger Clearance Adjustment



KEY	ITEM
1	Screw
2	Eccentric
3	Line Feed Lever
4	Line Feed Clutch Release Arm
5	Hexnut
6	Slide
7	Cancellation Spring
8	Cancellation Lever
9	Latch
10	Carriage Return Clutch Release Arm

Figure 5-53. Automatic Line Feed on Carriage Return Adjustment



KEY	ITEM
1	Letters-Figures Cam Follower
2	Bell Prevent Lever Clamp Screw
3	Bell Sensing Finger
4	Bell Prevent Lever
5	Bell Prevent Lever Tab
6	Letters Clutch Release Arm Tab
7	Function Bar
8	Function Slides
9	Letters Clutch Release Arm

Figure 5-54. Bell Sensing Finger Adjustment

(13) LINE FEED ADJUSTMENT. - Line feed adjustment is performed to ensure that single and double line feed can be selected.

NOTE

Check that line feed adjustment is in compliance with requirements established in Steps 1, 9, and 10. If requirements are not met, perform the following adjustment sequence.

Step 1. Remove printer from chassis and stand printer on its backplate.

Step 2. Depress line feed off-line function pusher (Figure 5-55) to release line feed clutch and rotate mainshaft until line feed cam follower is at the high point of the cam.

Step 3. Rotate paper roller knob to make sure that detent is set in a tooth on line feed ratchet. There will be an audible click when this occurs.

Step 4. Lift line feed pawl as high as it will go then slowly let it down until reference tooth falls into line feed ratchet (ratchet is located directly behind line feed pawl).

Step 5. Hold line feed pawl in this position and place a screwdriver or spring hook over space shaft and under actuator pin. (Use screwdriver as a lever to hold line feed pawl in place, engaged with line feed ratchet.)

Step 6. With the screwdriver held under the actuator pin and line feed pawl engaged in ratchet, place an allen wrench in line feed cam follower clamp screw.

Step 7. Using allen wrench as a lever, align laterally and hold line feed cam follower against the high of the cam.

Step 8. Tighten line feed cam follower clamp screw.

Step 9. Check line feed adjustment a few times by depressing off-line feed function pusher and rotating mainshaft.

Step 10. Check in both single and double line feed by using line feed shift arm.

NOTE

If the line feed shift arm is set to single line feed and teletypewriter operates in double line feed condition, turn line feed shift adjustment screw clockwise until single line line feed is accomplished.

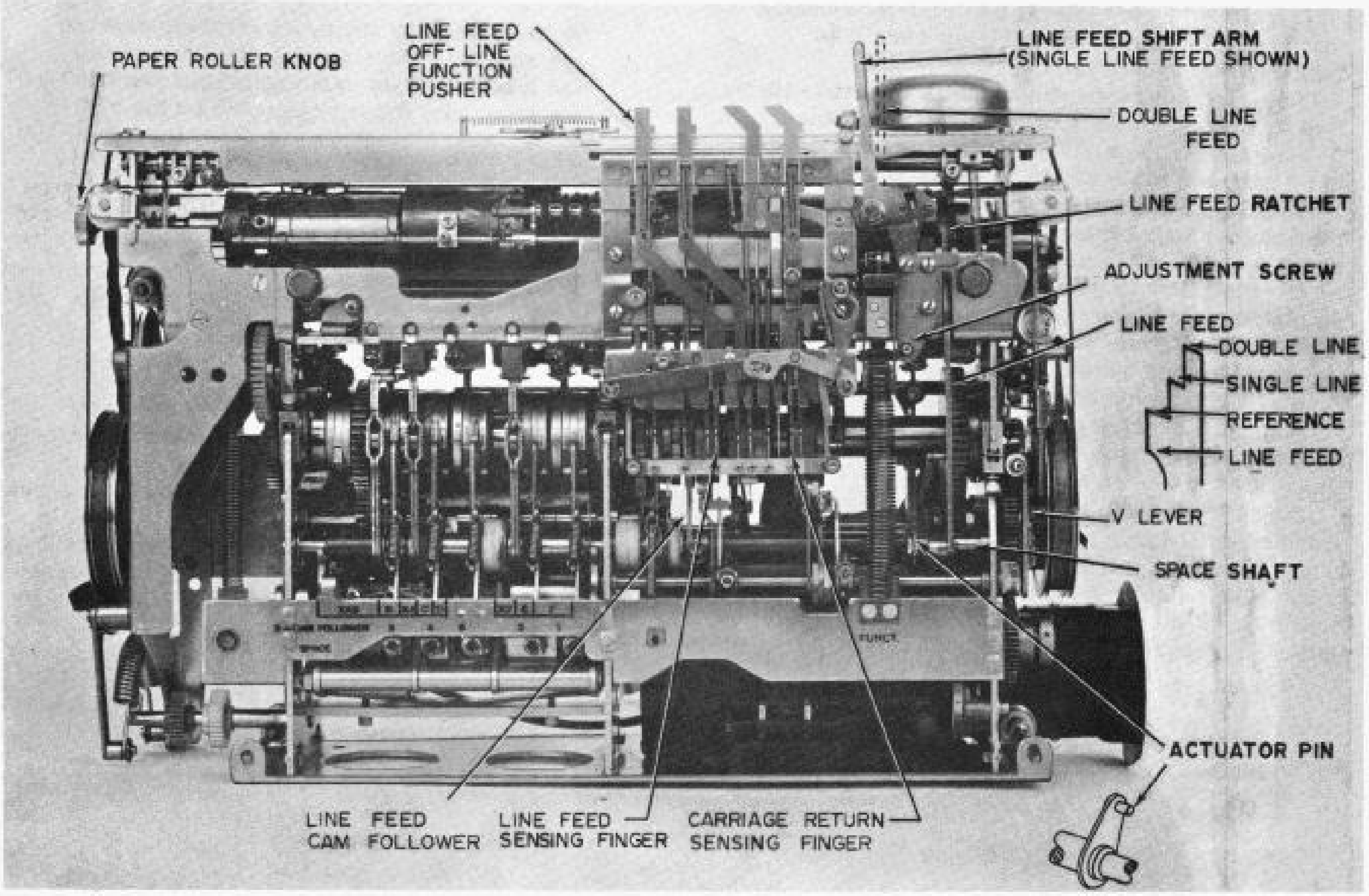


Figure 5-55. Line Feed Adjustment

(14) PRINT CYLINDER CLEARANCE FROM RIGHT FRAME AND HAMMER ALIGNMENT ADJUSTMENTS. - To establish the proper margin and print cylinder clearance on the right end of the line and to align the hammer with the print cylinder perform the following:

Step 1. Place printer in letters A.

Step 2. Rotate advance drum fully counterclockwise until two clicks are heard or felt, indicating the end of line has been reached.

Step 3. Check for 1/8 inch clearance between print cylinder shaft bushing clamp when printer is set for a 76 character line (1/2 inch clearance when printer is set for a 72 character line).

Step 4. If clearance as specified in Step 3 is not correct, proceed with Step 5.

Step 5. Loosen lateral belt clamp on advance drum and let out or takeup on lateral belt to establish proper clearance (1/8 inch for a 76 character line or a 72 character line format).

Step 6. With printer in letters A, check for a 1/8 inch clearance between lateral tension pulley and the outside diameter of takeup drum.

Step 7. If clearance in Step 6 is not correct loosen lateral belt clamp on takeup drum.

Step 8. Let out or takeup on lateral belt until lateral tension pulley pin is approximately 1/8 inch from the outside diameter of takeup drum.

Step 9. When clearance in Step 8 is correct insert lateral belt under its clamp on takeup drum, looping the excess belt and positioning it under lateral belt clamp.

Step 10. Tighten lateral belt clamp, checking that the belt remains under clamp when it is tightened.

Step 11. Advance cylinder halfway across the line by turning advance drum counterclockwise.

Step 12. With printer still in letters A, loosen print hammer cable clamp on advance drum.

Step 13. Loosen the hammer cable turns around the hammer bracket lugs to allow hammer and bracket assembly to move on its shaft.

Step 14. Position hammer and bracket assembly so that hammer face is aligned over letter A.

Step 15. Tighten hammer cable turns (by pulling on cable) around hammer bracket so that hammer face will remain directly over the letter A.

Step 16. Replace end of hammer cable under hammer cable clamp on advance drum, with moderate tension on hammer cable.

Step 17. Tighten hammer cable clamp screw (located on advance drum) to secure hammer cable under its clamp.

Step 18. Recheck hammer alignment with the letter A. If the hammer face is not aligned with the letter A, repeat Steps 13 through 17.

(15) PRINT SHAFT ADJUSTMENT. - This adjustment establishes correct angular relationship between print cam follower, print shaft terminal lever, and print prevent arm. Print shaft adjustment is accomplished as follows:

Step 1. Loosen following clamp screws: print cam follower clamp screw (3, Figure 5-56); print prevent arm clamp screw (4); and print spring arm clamp screw (1).

Step 2. Insert an allen wrench in the print cam follower clamp screw (3).

Step 3. Release print function clutch and rotate mainshaft until print cam follower drops to the low of its cam and then comes to the stop position.

Step 4. Loosen stop tab screw (4, Figure 5-57).

Step 5. Holding terminal lever (8) down against disconnect link (3), so that link tabs contact both terminal lever (8) and hammer shaft link (1).

Step 6. While holding the part positions in Step 5, tighten print spring arm clamp screw (1, Figure 5-56) and print cam follower clamp screw (3).

Step 7. Position stop tab (4, Figure 5-57) so that 1/32-inch clearance is established between terminal lever (8) and disconnect link (3) tab at point (2).

Step 8. Tighten stop tab screw (4).

Step 9. Release print function clutch and rotate mainshaft gradually until print cam follower rises to the high and drops into notch in the high of the print cam.

NOTE

Holding function spring up will help prevent the complete drop of print cam follower to the true low of its cam and permit positioning print cam follower in notch on the high of the cam.

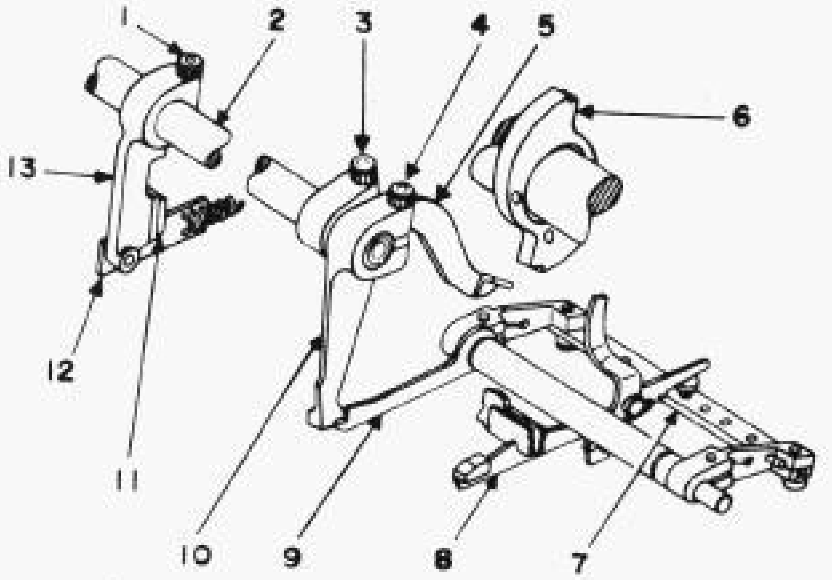
Step 10. Place an allen wrench in print prevent arm clamp screw (6, Figure 5-58), hold outward on print prevent bail (2) and using the wrench (in print prevent arm screw) as a lever, engage print prevent arm in notch (8) in print prevent bail lever (1).

NOTE

Ensure that print prevent is engaged in the notch and not on top of print prevent lever.

Step 11. Tighten print prevent arm clamp screw (6).

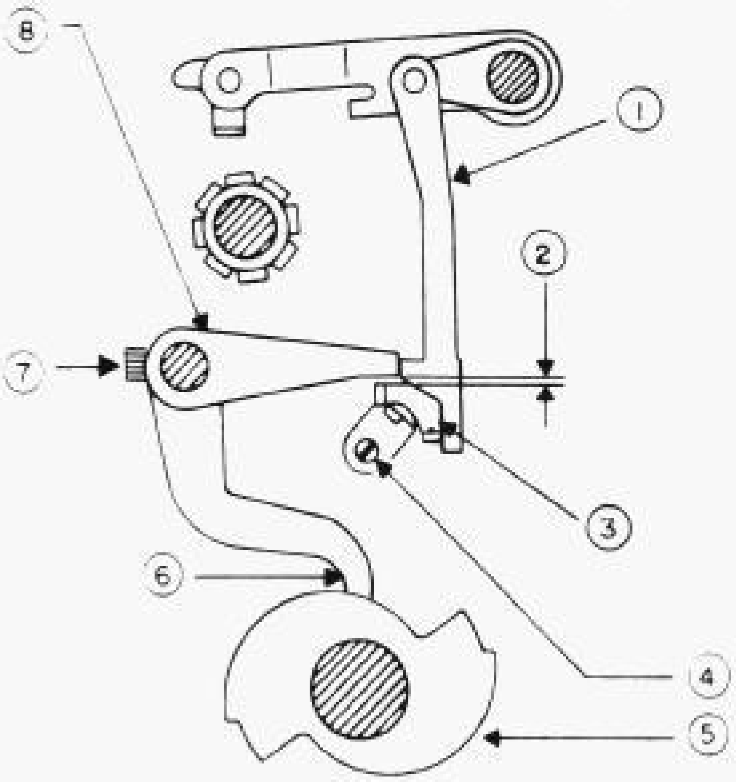
Step 12. Check print disconnect adjustment (Paragraph 5-5e(16)) after performing print shaft adjustment.



KEY	ITEM
1	Print Spring Arm Clamp Screw
2	Print Shaft
3	Print Cam Follower Clamp Screw
4	Print Prevent Arm Clamp Screw
5	Print Cam Follower
6	Print Cam

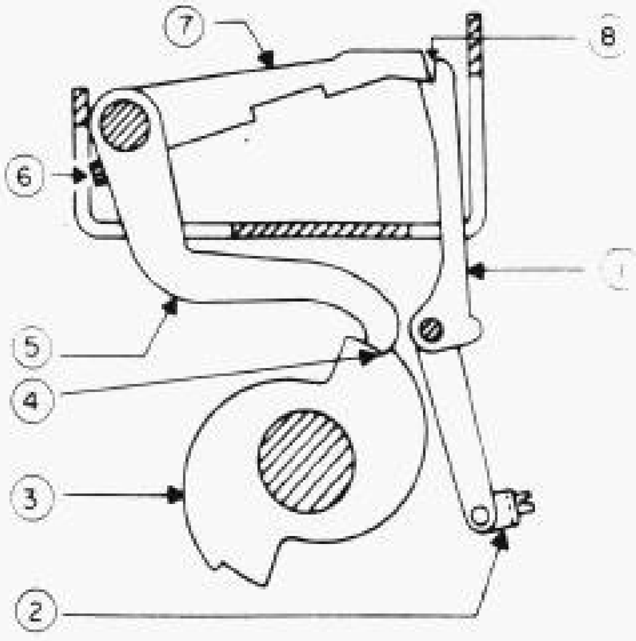
KEY	ITEM
7	Print Prevent Bail
8	Sensing Finger in Slides Pushes Bail Out
9	Print Prevent Bail Lever
10	Print Prevent Arm
11	Shock Pad
12	Print Spring Retaining Ring
13	Print Spring Arm

Figure 5-56. Print Shaft Adjustment (Print Prevention)



KEY	ITEM
1	Hammer Shaft Link
2	1/32 inch Clearance
3	Hammer Disconnect Link
4	Stop Tab Screw
5	Print Cam
6	Print Cam Follower at Low Point of Cam
7	Print Cam Follower Clamp Screw
8	Print Shaft Terminal Lever

Figure 5-57. Print Linkage Adjustment



KEY	ITEM
1	Print Prevent (Rod) Bail Lever
2	Print Prevent Bail Arm
3	Print Cam
4	Print Cam
5	Print Cam Follower
6	Print Prevent Arm Clamp Screw
7	Print Prevent Arm
8	Notch

Figure 5-58. Print Prevent Arm Engaged with Print Prevent Bail Lever

(16) PRINT DISCONNECT ADJUSTMENT. - The print disconnect adjustment releases hammer from the action of the print spring approximately 0.010 to 0.015 inches before hammer face contact with print cylinder.

NOTE

Check that print disconnect adjustment is in compliance with requirements established in Step 5. If requirements are not met, perform the following adjustment sequence.

Step 1. Rotate mainshaft until print function clutch is in stop position (clutch release lever is holding against clutch stop tab).

Step 2. Loosen both left and right-hand hammer drive shaft clamps (16, Figure 5-59, one clamp (left-hand) is shown).

Step 3. Retighten left-hand hammer drive shaft clamp (16) slightly so that it will move on hammer shaft, yet remain in position after movement.

Step 4. Hold hammer at point (2. Figure 5-60) against face of a character on print cylinder (13), and move hammer shaft link (8) toward front of printer.

Step 5. Insert allen wrench in print spring arm clamp screw (Figure 5-61), lift upward (forward) on print spring arm and then allow spring action (still holding hammer against print cylinder) to return print spring arm to rear (downward) position.

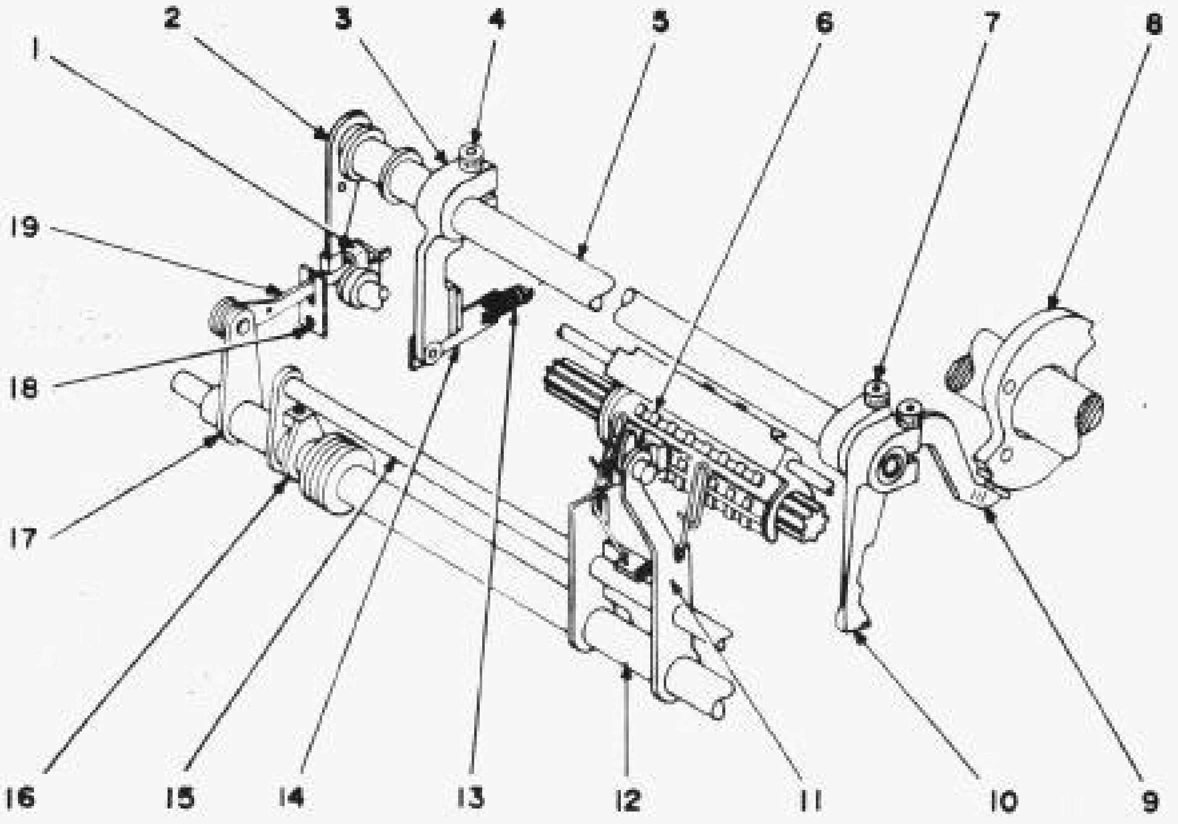
NOTE

The print shaft terminal lever (12, Figure 5-60) and hammer shaft link (8) should disconnect at lowest point of terminal lever travel.

Step 6. When disconnect action is accomplished (see NOTE after Step 5) tighten left hammer drive shaft clamp (16, Figure 5-59).

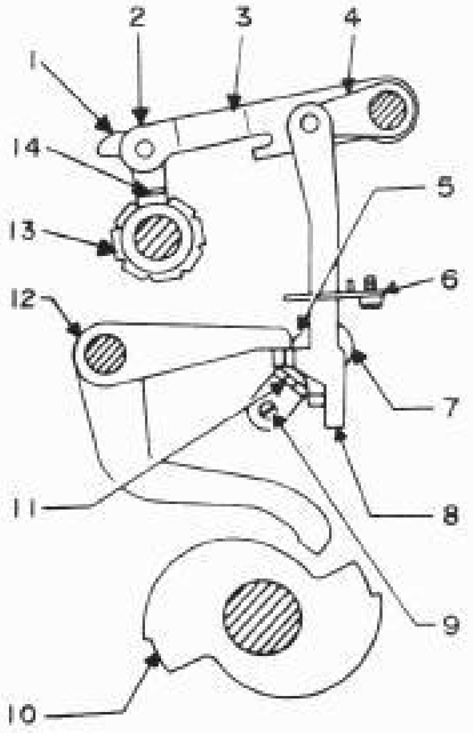
Step 7. Hold right-hand hammer drive shaft clamp (only left-hand clamp is shown) against stop strip on front plate and tighten the right-hand hammer drive shaft clamp screw.

Step 8. Recheck disconnect adjustment by performing Step 5.



KEY	ITEM
1	Hammer Disconnect Link
2	Terminal Lever
3	Print Spring Arm
4	Print Spring Arm Clamp Screw
5	Print Shaft
6	Print Cylinder
7	Print Cam Follower Clamp Screw
8	Print Cam
9	Print Cam Follower
10	Print Prevent Arm
11	Hammer
12	Hammer Shaft
13	Print Spring
14	Print Spring Retaining Plate
15	Hammer Drive Shaft
16	Hammer Drive Shaft Clamp (Left)
17	Hammer Lever
18	Hammer Shaft Link Guide Plate
19	Hammer Shaft Link

Figure 5-59. Printing Action Linkage



KEY	ITEM
1	Hammer
2	Press down here to hold hammer against cylinder
3	Print Hammer Bracket
4	Lever
5	Minimum Perceptible Clearance
6	Hammer Shaft Arm Guide Bracket
7	Hammer Disconnect Link
8	Hammer Shaft Link
9	Stop Screw
10	Cam
11	Stop
12	Print Shaft Terminal Lever. Rotate Terminal Lever by Raising and Lowering Print Spring Arm (Using a wrench inserted in clamping screw)
13	Print Cylinder
14	Hammer Face

Figure 5-60. Print Disconnect Adjustment

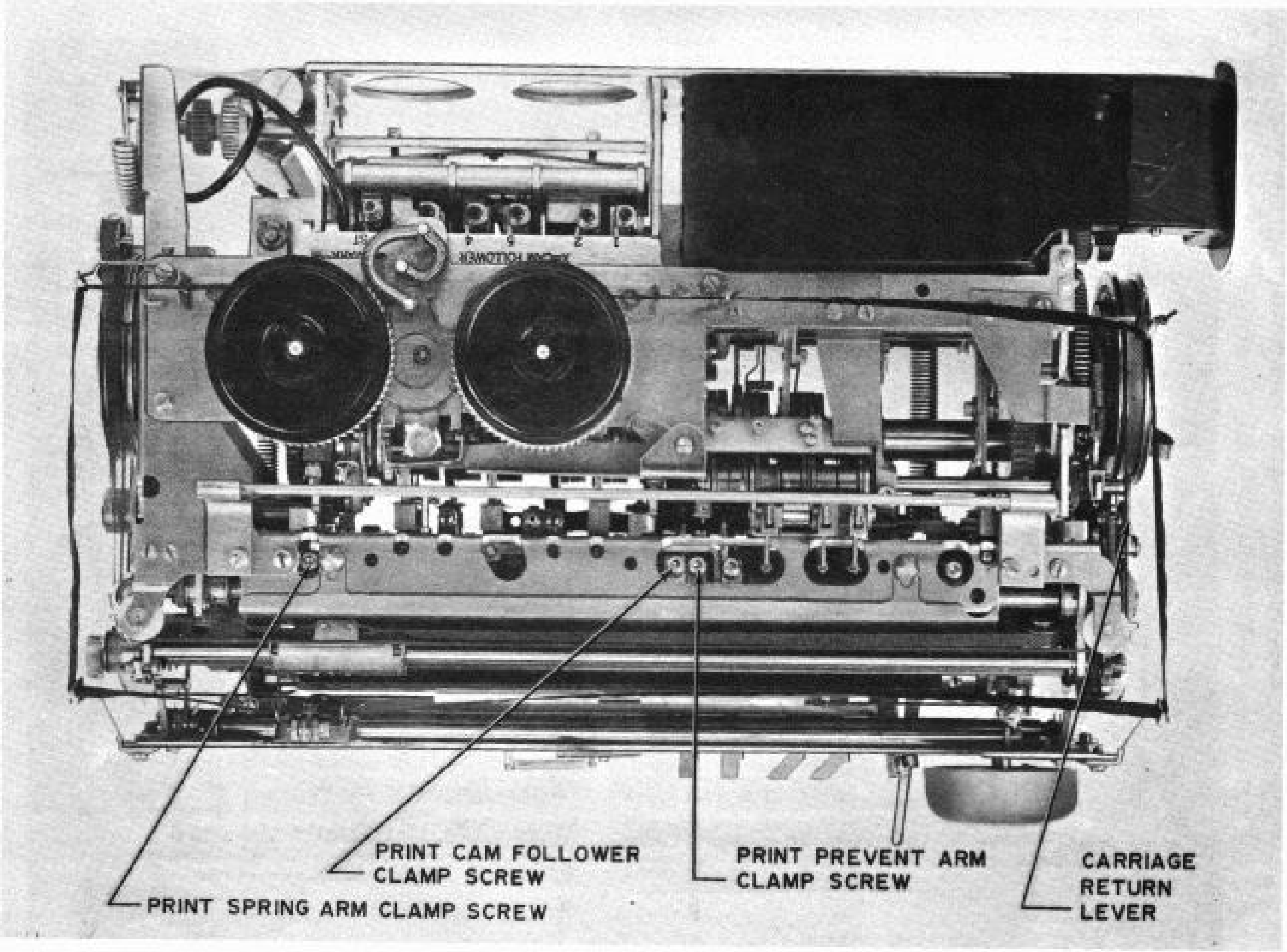

PRINT CAM FOLLOWER CLAMP SCREW
PRINT SPRING ARM CLAMP SCREW
PRINT PREVENT ARM CLAMP SCREW
CARRIAGE RETURN LEVER

Figure 5-61. Print Disconnect and Print Shaft Adjustment

(17) MAGNETIC SELECTOR ADJUSTMENT. - Magnetic selector adjustment is performed with the teletypewriter switched for local loop, signal cable connector removed, and rotary mode switch in the off-line position. Magnetic selector adjustment is performed as follows:

NOTE

With AN/UGC-38 and AN/UGC-40 equipments, pins A and B in chassis signal connector must be shorted together (use a small alligator clip). Switch rotary mode switch to on-line to momentarily break internal signal loop.

Step 1. Remove motor plug, signal cable connector, and turn teletypewriter ON.

Step 2. Pull out range dial knob and rotate range dial fully counterclockwise.

Step 3. Rotate mainshaft until all clutches stop.

Step 4. Break signal line (momentarily) by pressing the keyboard break button on AN/UGC-41 or momentarily switch rotary mode switch to on-line mode for AN/UGC-38 and AN/UGC-40.

Step 5. Rotate range dial fully clockwise and then back-up approximately 10 to 20 points on range dials.

Step 6. Adjust number 1, 3, and 5 (Figure 5-62) clutch release arm adjustment screws on the mark side (located on the top of the printer) for a clearance of 0.008 to 0.010 inch (Figure 5-63) between the tips of clutch release arm adjustment screws and the paddle or tab directly below it. (This clearance is established with the paddle or tab depressed.)

Step 7. Loosen printer locking screws and disengage printer slide locks.

Step 8. Slide printer slightly to the rear to disengage manual off-line function slide pushers from the front of the electrical chassis and place printer on its backplate.

Step 9. Open the internal signal line switching rotary mode switch to on-line. (All equipments).

Step 10. Adjust all clutch release arm adjustment screws (number 1 through 5) on the space side (located on the bottom of the printer) for a clearance of 0.008 to 0.010 inch between the tips of clutch release arm adjustment screws and the paddle directly below it. This clearance is established by moving the armature under the paddle and then depressing the paddle.

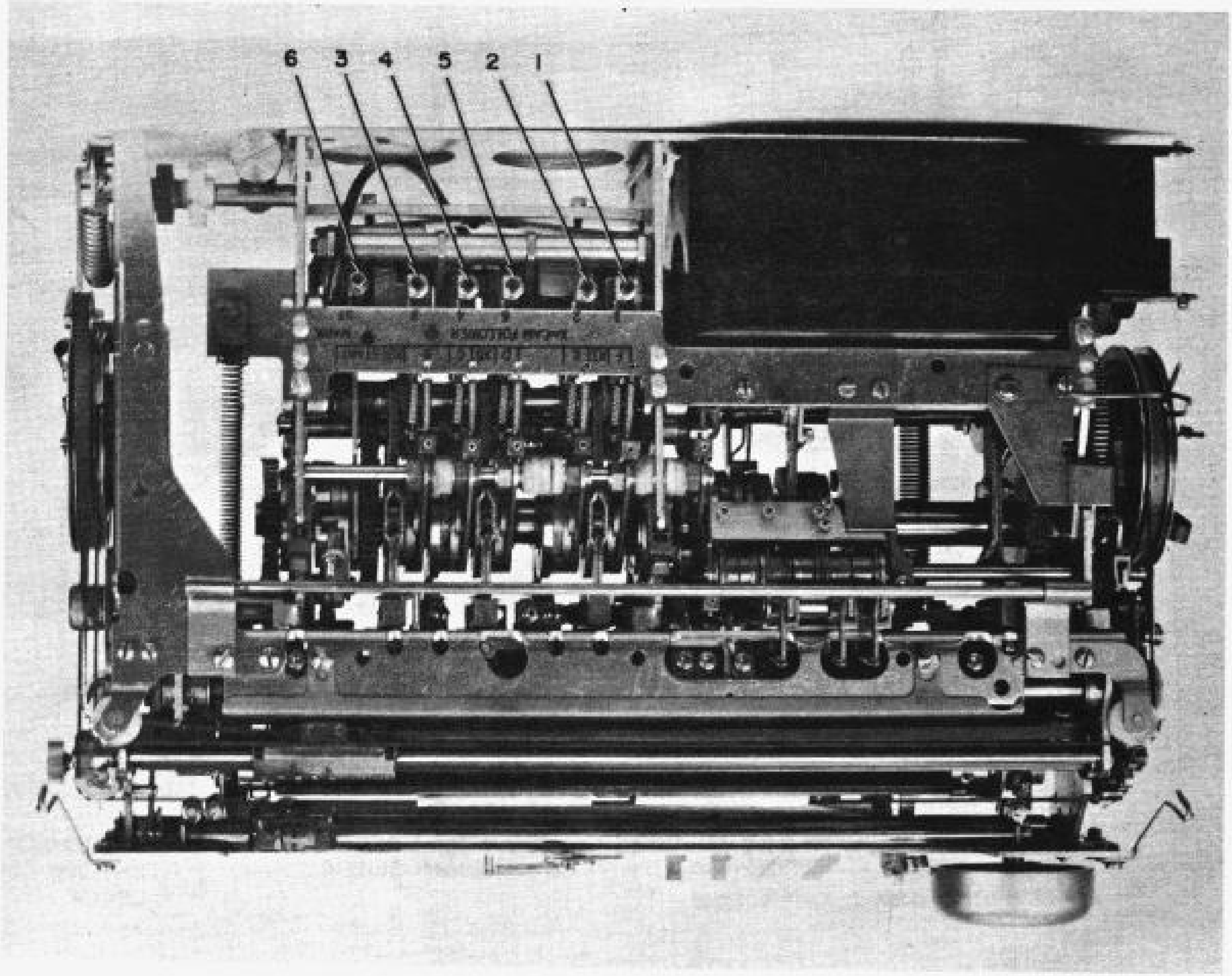


Figure 5-62. Magnetic Selector Adjustment

Step 11. Return rotary mode switch to off-line position for steady mark condition.

Step 12. Replace printer on chassis, by reversing Steps 7 and 8.

Step 13. Tighten printer locking screws and engage printer slide locks.

Step 14. Rotate mainshaft until number 1 clutch release arm drops.

Step 15. Adjust start clutch (6, Figure 5-62) number 2 and number 4 clutch release arm adjustment screws located on the mark side (top of the printer) for a clearance of 0.008 to 0.010 inch (Figure 5-63) between the tips of clutch release arm adjustment screws and the paddle or tab directly below it. (This clearance is established with the paddle or tab depressed.)

CAUTION

DISCHARGE MOTOR STARTING CAPACITOR BY TURNING THE TELETYPEWRITER OFF FOR APPROXIMATELY 30 SECONDS PRIOR TO RE-CONNECTION OF MOTOR.

(18) ROTARY, LATERAL, AND LETTERS FIGURES CARRIAGE PULLEY STROKE ADJUSTMENTS. - Rotary, lateral, and letters-figures carriage pulley stroke adjustments are performed to ensure the proper positioning of the print cylinder. Adjustments can be performed separately but when one is performed a check of the other adjustments should be made. Figure 5-64 is included for reference while performing the following adjustments.

NOTE

Prior to performing rotary, lateral, and letters figures carriage pulley stroke adjustments, apply power to printer, observe ribbon travel in both directions. Form guides so that ribbon travels in center of guides and does not fold up or down. (Print hammer guides should be parallel to hammer face and as far forward as possible, but should not hit paper guide assembly.)

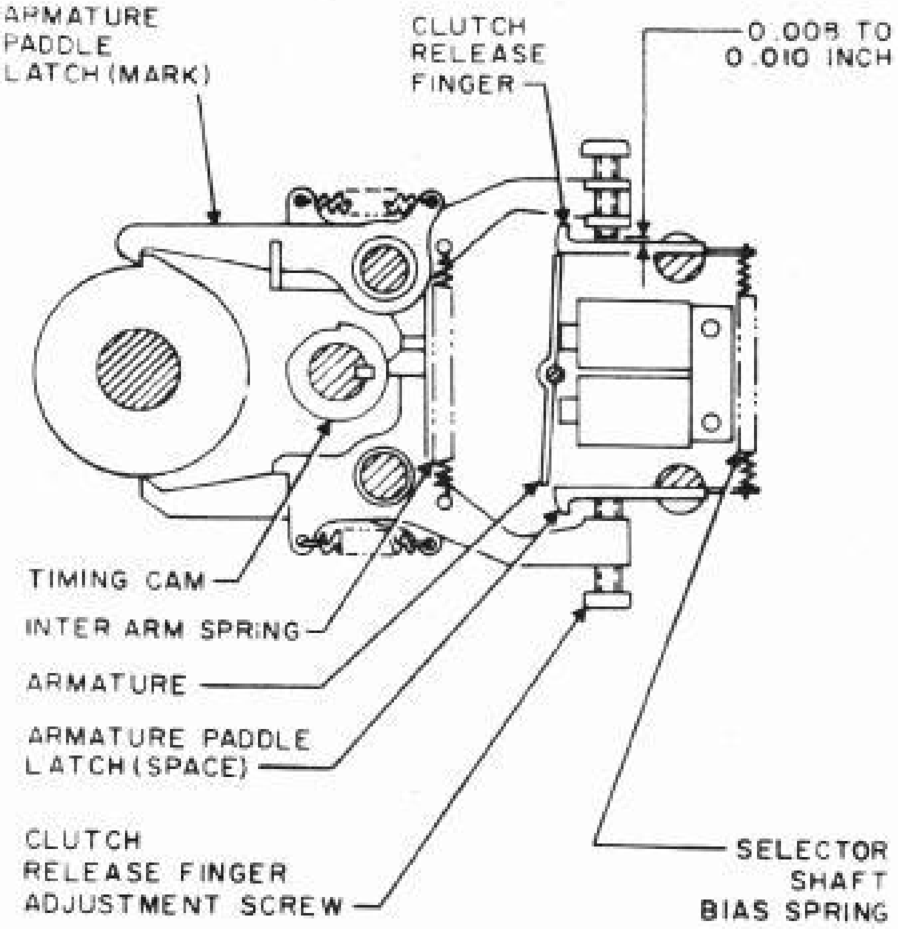
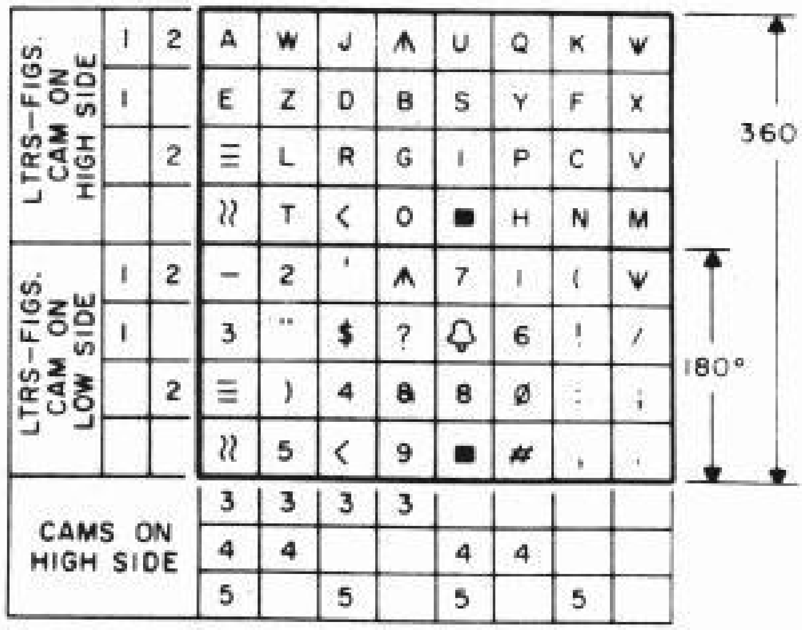

ARMATURE PADDLE LATCH (MARK)
CLUTCH RELEASE FINGER
0.008 TO 0.010 INCH
TIMING CAM
INTER ARM SPRING
ARMATURE
ARMATURE PADDLE LATCH (SPACE)
CLUTCH RELEASE FINGER ADJUSTMENT SCREW
SELECTOR SHAFT BIAS SPRING

Figure 5-63. Selector Clutch Release Mechanism



LTRS–FIGS. CAM ON HIGH SIDE	1	2	A	W	J	∧	U	Q	K	∨
	1		E	Z	D	B	S	Y	F	X
		2	≡	L	R	G	I	P	C	V
			≀	T	<	O	■	H	N	M
LTRS–FIGS. CAM ON LOW SIDE	1	2	–	2	'	∧	7	1	(	∨
	1		3	"	$	?	🔔	6	!	/
		2	≡	)	4	&	8	0	:	;
			≀	5	<	9	■	#	,	.
CAMS ON HIGH SIDE			3	3	3	3				
			4	4			4	4		
			5		5		5		5	

Figure 5-64. Plan View of Print Cylinder

(a) ROTARY STROKE ADJUSTMENT. - Rotary stroke adjustment is performed to ensure proper rotary positioning of print cylinder strips. Perform Steps 1, 2, 3, 4, 6, 9 and 12 to check rotary stroke adjustment. Rotary stroke adjustment is performed as follows:

Step 1. Put printer in letter A, remove printer from chassis, and place printer on its backplate.

Step 2. Check rotary slide alignment with index mark on function selector frame.

NOTE

If alignment is not correct refer to paragraph 5-5e(3)(b) for rotary slide alignment adjustment procedure and realign rotary slide. If rotary slide alignment is correct proceed with the following steps

Step 3. Replace printer on the chassis.

Step 4. Using the repeat (REP) key, continuously print letter A and observe movement of index wheel, (4, Figure 5-65).

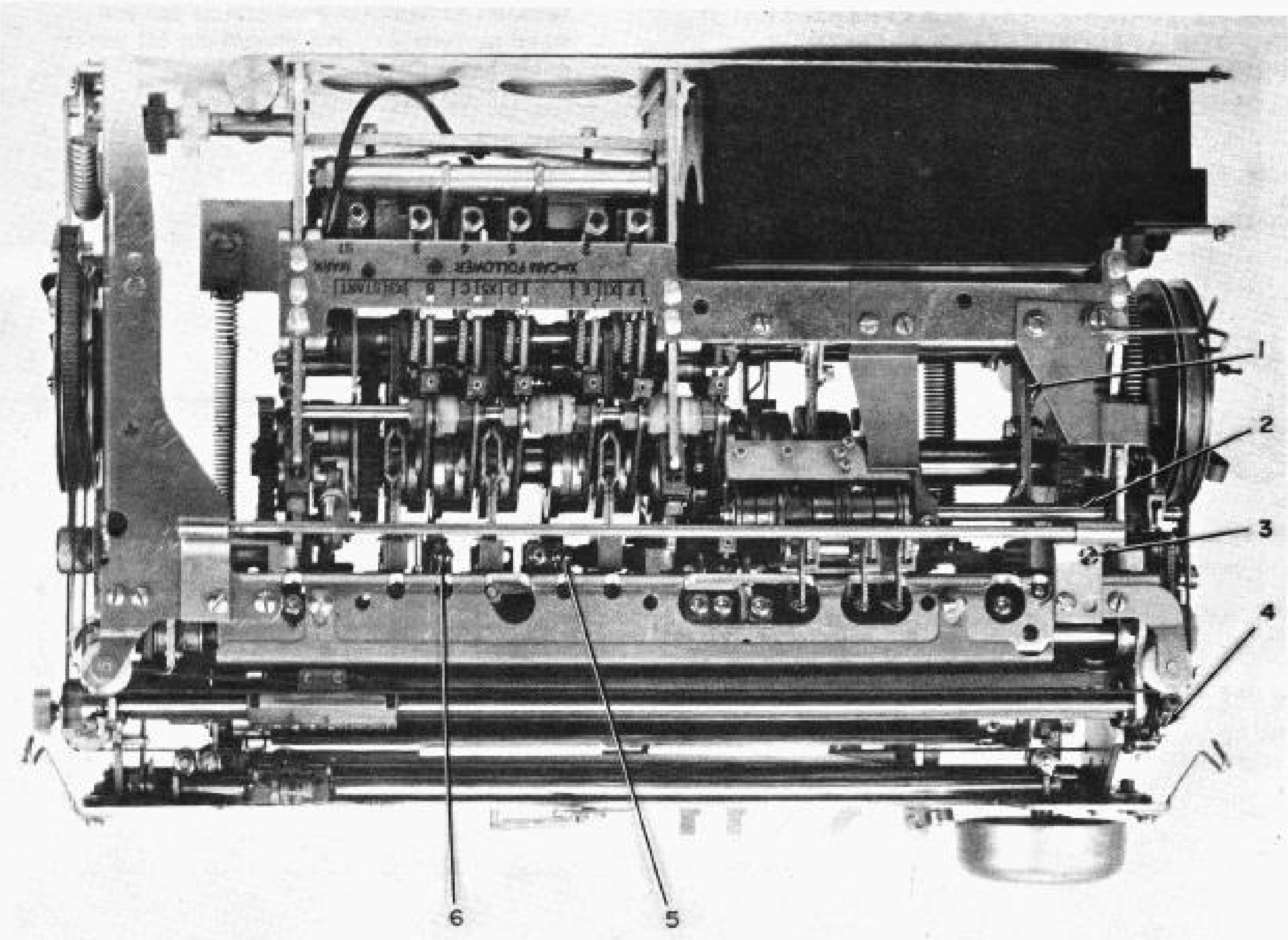
Step 5. Adjust rotary cable adjustment screw (3) until detent pawl pin engagement with index wheel results in minimum or no movement of index wheel.

Step 6. Using REP key, continuously print letter E, and observe movement of index wheel.

Step 7. Adjust number 2 cam follower stroke adjustment screw (5) until detent pawl pin engagement with index wheel results in minimum or no movement of index wheel.

Step 8. Tighten number 2 cam follower stroke adjustment screw, locknut, while holding screw to prevent disturbing stroke setting (screw adjustment.)

Step 9. Using REP key, continuously print letter L, and observe movement of index wheel.



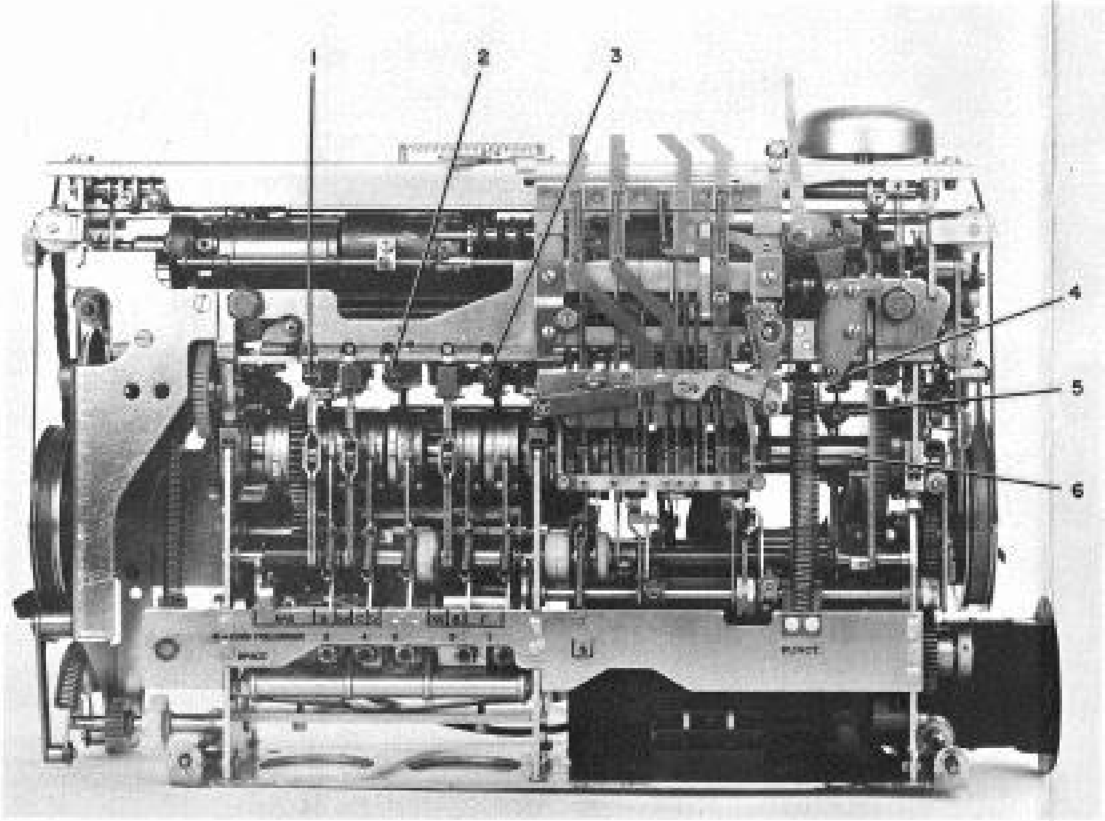
KEY	ITEM	KEY	ITEM
1	Letters Figures Arm, Adjustment Screw	5	Number 2 Cam Follower Stroke, Adjustment Screw
2	Carriage Return Shaft	6	Number 4 Cam Follower Stroke, Adjustment Screw
3	Rotary Cable, Adjustment Screw		
4	Index Wheel		

Figure 5-65. Top View of Printer, Ribbon Feed Mechanism Removed

Step 10. Remove printer from chassis, stand it on its backplate and adjust number 1 cam follower stroke adjustment screw (3, Figure 5-66) until detent pawl pin engagement with index wheel results in minimum or no movement of index wheel.

Step 11. Tighten number 1 cam follower stroke adjustment screw locknut while holding the screw to prevent disturbing the stroke setting performed in formed in Step 10.

Step 12. Replace printer on chassis and using REP key, continuously print letter T, and observe movement of index wheel. This checks cam follower stroke adjustments performed in Steps 1 through 11. If movement of index wheel is more than 0.010 inch when letter T is printed, repeat Steps 1 through 11.



KEY	ITEM
1	Number 3, Cam Follower Stroke, Adjustment Screw
2	Number 5, Cam Follower Stroke, Adjustment Screw
3	Number 1, Cam Follower Stroke, Adjustment Screw
4	Letters-Figures Cam Follower Stroke, Adjustment Screw
5	Letters-Figures Arm Adjustment Screw
6	Mainshaft

Figure 5-66. Bottom View of Printer

(b) LATERAL STROKE ADJUSTMENT. - Lateral stroke adjustment ensures proper lateral alignment of print cylinder behind hammer. Perform Steps 2, 4, 6, and 8 to check lateral stroke adjustment. The first nine steps of the following lateral stroke adjustment are performed without paper in printer to permit a check of print cylinder characters and hammer alignment.

Step 1. Lateral belt inertia damper (Figure 5-67) should be disabled, by loosening hexnuts (6 and 7) to allow pulley assembly (3) to turn freely during lateral stroke adjustment.

Step 2. Transmit letter A and check alignment of hammer with letter A on print cylinder.

Step 3. Check lateral slide alignment mark with the index mark on function selector frame. If adjustment is required, refer to Paragraph 5-5e(4(b).

Step 4. If necessary, realign hammer with letter A by loosening hammer clamp cable (on advance drum) and repositioning hammer on its cable.

Step 5. Tighten hammer cable clamp (on advance drum) when hammer is aligned.

Step 6. Transmit letter W and adjust number 5 cam follower stroke adjustment screw (2, Figure 5-66) until letter W is aligned with hammer face.

Step 7. Transmit letter J and adjust number 4 cam follower stroke adjustment screw (6, Figure 5-65) until letter J is aligned with hammer face.

Step 8. Transmit letter U and adjust number 3 cam follower stroke adjustment screw (1, Figure 5-66) until letter U is alinged with hammer face.

Step 9. Insert paper in printer, print a line of A's, and depress carriage return key. (Do not actuate line feed.)

Step 10. Print a line of T's directly over the line of A's printed in Step 9.

Step 11. Adjust number 5 cam follower stroke adjustment screw (2) until the T's are centered over the A's. **E**

Step 12. Tighten number 5 cam follower screw locknut while holding screw to prevent disturbing stroke setting performed in Step 11.

Step 13. Print a line of superimposed I's over a line of A's.

Step 14. Adjust number 3 cam follower stroke adjustment screw (1, Figure 5-66) until I's are centered over the A's. **AA**

Step 15. Tighten number 3 cam follower stroke adjustment screw locknut while holding screw to prevent disturbing stroke setting performed in Step 14.

Step 16. Print a line of D's superimposed over a line of E's.

Step 17. Adjust number 4 cam follower stroke adjustment screw (6, Figure 5-65) until the D's are superimposed squarely over the E's. **B**

Step 18. Tighten number 4 cam follower stroke adjustment screw locknut while holding screw to prevent disturbing the stroke setting performed in Step 17.

(c) LATERAL BELT INERTIA DAMPER ADJUSTMENT. - The lateral belt inertia damper regulates lateral belt movement to compensate for the inherent flexibility of lateral belt print cylinder positioning system. This permits refinement of lateral stroke, ensuring even spacing between characters, by reducing print cylinder over-travel during character selection. (Refer to Figure 5-67).

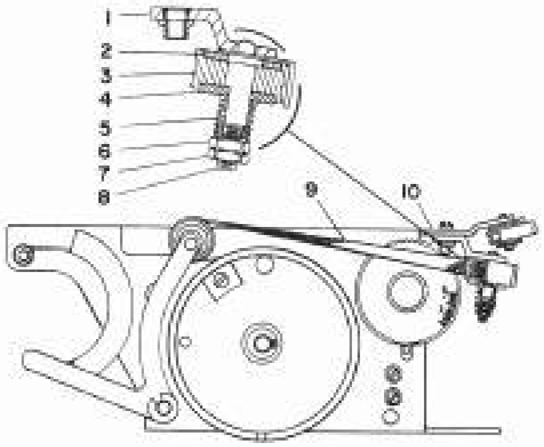
Step 1. Loosen locking nut (7).

Step 2. Depress letter A and then repeat (REP) key.

Step 3. While transmitting letter A (using the REP key), tighten adjusting nut (6) until belt pulley assembly (3) stops moving, and then loosen nut (6) until there is a resumption of movement of belt pulley (3).

Step 4. Hold adjusting nut (6) with a wrench and lock it with locking nut (7).

Step 5. Transmit a series of A's to ensure that there is movement of the pulley.



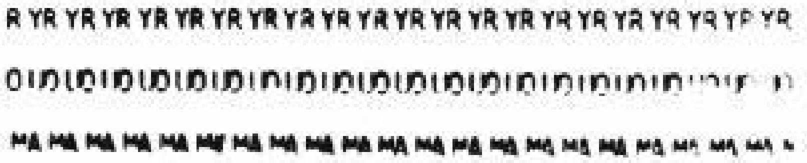
KEY	ITEM
1	Bracket Assembly
2	Friction Washer
3	Belt Pulley Assembly
4	Washer
5	Compression Spring
6	Adjusting Nut
7	Locking Nut
8	Bracket Stud (Part of Item 1)
9	Lateral Control Belt
10	Takeup Drum Bracket Assembly

Figure 5-67. Lateral Belt Inertia Damper (Side View of Printer)

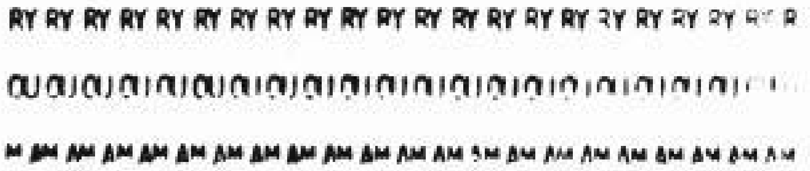
(d) FINE ADJUSTMENT OF LATERAL STROKE. - The following procedures should be used for fine adjustment of number 3, 4, and 5 cam follower stroke adjustment screws to correct unequal spacing between characters AM, RY, and OU. The adjustment of spacing between characters AM, RY, and OU improves overall spacing of all printed copy. In some instances it might be necessary to throw out the spacing of one combination of characters to correct the spacing of another combination of characters. Print a line of AM's, RY's, and OU's and observe the spacing between the characters.

(1) ADJUSTMENT OF NUMBER 3 LATERAL SCREW

Example 1. (Cause: #3 screw too far "IN")



Example 2. (Cause: #3 screw too far "OUT")



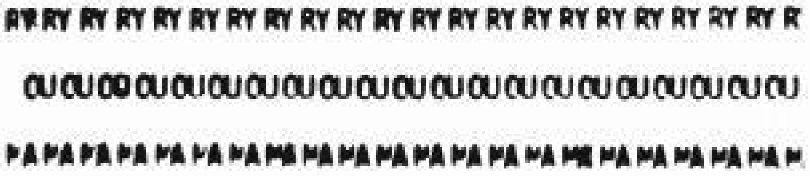
Step 1. Observe spacing between letters A-M, R-Y, and O-U.

Step 2. If spacing between letters AM, RY, and OU is too far apart (example 1) turn #3 cam follower stroke adjustment screw counterclockwise (moving letters M, Y, and U to the left) until proper spacing is obtained.

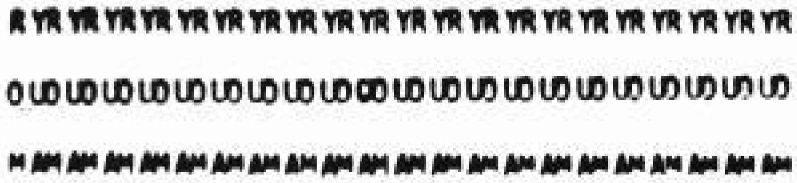
Step 3. If spacing between letters AM, RY, and OU is too tight (example 2) turn #3 cam follower stroke adjustment screw clockwise (moving letters M, Y, and U to the right) until proper spacing is obtained.

(2) ADJUSTMENT OF NUMBER 4 LATERAL SCREW

Example 1. (Cause: #4 screw too far "IN")



Example 2. (Cause: #4 screw too far "OUT")



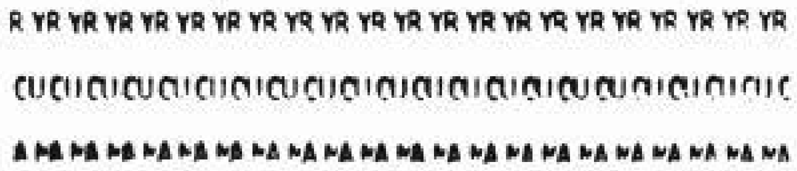
Step 1. Observe spacing between letters A-M, R-Y, and O-U.

Step 2. If letters Y and U are too far to left, and letter M is too far to the right (example 1) turn #4 cam follower stroke adjustment screw counterclockwise (moving letter M to the left and letters Y and U to the right) until proper spacing is obtained.

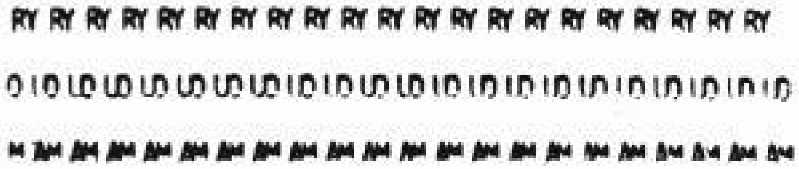
Step 3. If letters Y and U are too far to the right and letter M is too far to the left (example 2) turn #4 cam follower stroke adjustment screw clockwise (moving letter M to the right and letters Y and U to the left) until proper spacing is obtained.

(3) ADJUSTMENT OF NUMBERS LATERAL SCREW

Example 1. (Cause: #5 screw too far "IN")



Example 2. (Cause: #5 screw too far "OUT")



Step 1. Observe spacing between letters A-M, R-Y, and O-U.

Step 2. If letters M and Y are too far to the right and letter U is too far to the left (example 1) turn #5 cam follower stroke adjustment screw counterclockwise (moving letter M and Y to the left and letter U to the right), until proper spacing is obtained.

Step 3. If letters M and Y are too far to the left and letter U is too far to the right (example 2) turn #5 cam follower stroke adjustment screw clockwise (moving letters M and Y to the right and letter U to the left), until proper spacing is obtained.

(e) LETTERS-FIGURES CARRIAGE PULLEY STROKE ADJUSTMENT. - The last stroke adjustment to be made is letters-figures, which operates on the rotary cable to shift from letters to figures or vice versa.

NOTE

Check that letters-figures carriage pulley stroke adjustment is in compliance with requirements established in Steps 1 through 4. If requirements are not met, perform the following adjustment procedure.

Step 1. Operate letters off-line function lever and repeatedly transmit letter A, while observing movement of index wheel.

Step 2. If necessary, adjust rotary cable adjustment screw until there is little or no movement in index wheel when index wheel is engaged by rotary detent pin.

Step 3. Operate figures off-line function lever and repeatedly transmit figures A (-) and observe movement of index wheel.

Step 4. If there is more than 0.010 inch movement of index wheel, or figure A (-) type row is not aligned with hammer face, adjust letters-figures cam follower stroke adjustment screw (4, Figure 5-66) (screw is located in letters-figures bracket) until repeated transmissions of figures A (-) result in minimum or no movement of index wheel; this ensures that the letters-figures shift is exactly 180 degrees rotation of print cylinder.

NOTE

Steps 5 through 7 should be performed only if the following conditions prevail:

(a) letters-figures arm (5, Figure 5-66) is hitting against mainshaft (6) or carriage return cam follower shaft (2, Figure 5-65); and

(b) letters-figures carriage pulley stroke adjustment cannot be obtained by adjustment of letters-figures cam follower adjustment screw (4, Figure 5-66). Letters-figures arm adjustment screw is preset at factory and should not require readjustment.

Step 5. Put printer in letter A.

Step 6. Loosen locknut on letters-figures arm adjustment screw (1, Figure 5-65), and using an internal-hex wrench, turn adjustment screw inward until letters-figures arm clears carriage return shaft (2) by approximately 1/32 to 1/16 inch.

Step 7. Tighten locknut on letters-figures arm adjustment screw when 1/32 to 1/16 inch clearance is established between letters-figures arm and carriage return shaft.

(19) PRINT PREVENT ADJUSTMENT. - Print prevent adjustment suppresses printing of functions: blank, line feed, figures, bell, letters, and carriage return.

NOTE

MITE Corporation Special Tool, Part Number 38652, referenced herein, facilitates the accomplishment of the print prevent adjustment by eliminating the need for removal of the manual off-line function slide assembly (8, Figure 5-68). If the special tool is not available, however, it is necessary to accomplish removal of the manual off-line function slide assembly. Instructions for both methods are contained and identified in the following procedure.

Step 1. Transmit letter "A" printer.

Step 2. Remove printer from chassis (disengaging slide locks and screws), stand printer on its backplate (on chassis) with both motor and selector plugs still connected to their receptacles.

Step 3. Check rotary and lateral slide alignment and realign slides if necessary. Refer to Paragraphs 5-5e(3)(b) and 5-5e(4)(b), if slide alignment is required.

Step 4. If only minor adjustment of print prevention is required (only one or two functions are printing) proceed with Step 15. If entire print prevention adjustment is required (all functions are printing) proceed with Step 5.

NOTE

If MITE Corporation Special Tool, Part Number 38652 is available, do not remove manual off-line function slide assembly in Step 5. If Special Tool is not available, it is necessary to remove manual off-line function slide in Step 5.

Step 5. Remove four screws, manual off-line function slide assembly (8, Figure 5-68), and disconnect bell clapper arm wire (temporarily hook wire over hammer cable).

Step 6. Rotate print function clutch to its stop position.

Step 7. Place a screwdriver under print spring arm (13, Figure 5-69) lift up print spring arm (13) until print prevent arm (10) is engaged in notch of print prevent lever (9). (Pull outward on print prevent bail (7) to position print prevent lever (9) under print prevent arm (10).)

Step 8. Check alignment of print prevent adjustment screws (3, Figure 5-68) with sensing fingers (2) to ensure contact of sensing fingers with head of adjustment screws.

NOTE

Carriage return print prevent adjustment screw should be opposite the second sensing finger from the right.

Step 9. If adjustment screws (3) and sensing fingers (2) alignment is not correct, loosen print prevent bail mounting screws (6) and shift bail to correct alignment.

Step 10. Re-tighten print prevent bail mounting screws (6).

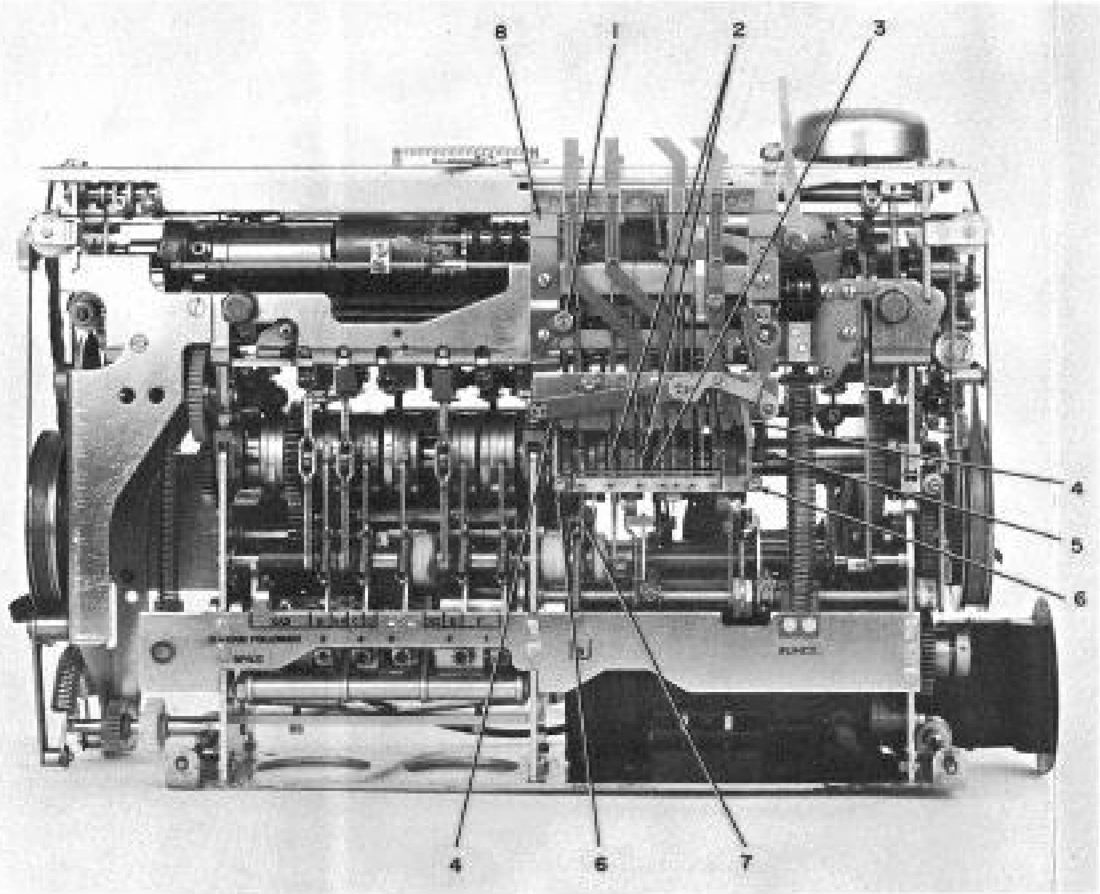
Step 11. Loosen two print prevent actuator arm clamping screws (4) and pull bail (approximately 1/2 inch) away from sensing fingers (2).

Step 12. Turn blank print prevent adjustment screw (3, on extreme left of bail) and the carriage return print prevent adjustment screw clockwise (3, on extreme right of bail) until adjustment screw end is flush with nylon locking strip on bail.

Step 13. Push in print prevent bail (7, Figure 5-69) until print prevent adjustment screws (blank and carriage return) are touching their respective sensing fingers (8).

Step 14. Tighten two print prevent actuator arm clamping screws (4, Figure 5-68).

Step 15. Turn all (including blank and carriage return) print prevent adjustment screws, on bail, counterclockwise until large diameter head of screw makes contact with inner surface of bail.



KEY	ITEM
1	Print Prevent Stop Arm Screw
2	Sensing Fingers
3	Print Prevent Adjustment Screws (Reading from left to right) BLANKS SPACE FIGURES LINE FEED FIGURES BELL LETTERS CARRIAGE RETURN
4	Print Prevent Actuator Arm Clamping Screws
5	Print Prevent Bail Spring
6	Print Prevent Bail Mounting Screws
7	Print Function Clutch Release Arm
8	Manual Off-Line Function Slide Assembly

Figure 5-68. Print Prevent Adjustment

NOTE

Disregard Step 16 if only minor print adjustment is required or manual off-line function slide was not removed in Step 5.

Step 16. Attach manual off-line function slide assembly (8, Figure 5-68) using four screws, unhook bell clapper wire from hammer cable and connect to bell clapper arm.

NOTE

Make sure that bell sensing finger is not jammed in slides or in front of stop strip. Stop strip should be positioned with end tabs up.

Step 17. Loosen locknut on print prevent stop arm screw (1, Figure 5-68).

Step 18. Turn motor switch on and transmit letters "A" repeatedly by pulling out on print function clutch release arm (7).

Step 19. Turn print prevent stop screw clockwise until printing of letters "A" is suppressed.

Step 20. Turn print prevent stop screw counterclockwise for 1/2 a turn when printing of letters "A" is suppressed.

Step 21. Tighten print prevent stop screw locknut (1, Figure 5-68).

Step 22. Transmit blanks and adjust blank print prevent adjustment screw (when not transmitting) until printing is suppressed. (Make screw adjustments in small increments, removing adjusting tool from screw to check for print suppression).

NOTE

Blanks (or any other function) can be transmitted by stopping the start clutch, Paragraph 5-5d (3), setting up mainshaft for blanks (or function required) and then pulling outward on print function clutch release arm.

Step 23. When complete (continuous) print prevention of blanks is present (print hammer does not strike print cylinder), turn in blank print prevent adjustment screw one more complete turn.

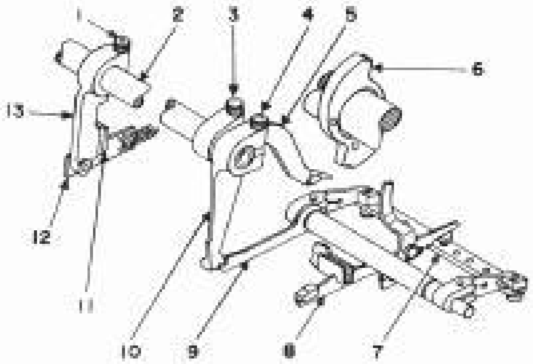
Step 24. Repeat Steps 22 and 23 for the functions line feed, figures, bell (in figures), letters and carriage return.

Step 25. Transmit figures A (-) and check for movement of print prevent bail.

Step 26. If print prevent bail does move, place print function clutch on high of cam, check sensing fingers for contact with print prevent adjustment screws, and proceed with Step 27. If print prevent bail does not move, proceed with Step 28.

Step 27. Back out print prevent adjustment screws 1/4 turn at a time until print prevent bail no longer moves when figures A (-) is transmitted.

Step 28. If print prevention of functions is accomplished with the printer standing on its backplate but not when in operating position on the chassis, the print prevent bail spring is defective and should be replaced.



KEY	ITEM
1	Print Spring Arm Clamp Screw
2	Print Shaft
3	Print Cam Follower Clamp Screw
4	Print Prevent Arm Clamp Screw
5	Print Cam Follower
6	Print Cam
7	Print Prevent Bail
8	Sensing Finger
9	Print Prevent Lever
10	Print Prevent Arm
11	Shock Pad
12	Print Spring Retaining Plate
13	Print Spring Arm

Figure 5-69. Print Prevent Adjustment

(20) PRINT DASH (-) IN UPPER CASE (figures) BLANKS (AN/UGC-38 only). - The teleprinter Set AN/UGC-38 (Weather-Communications) prints a dash (-) in upper case blanks. To print in upper case blanks perform the following procedure (Refer to Figure 5-70).

Step 1. Place printer on its backplate.

Step 2. Position printer mainshaft clutches for blanks.

NOTE

> All five intelligence clutches are held by space (lower) clutch release fingers when in blanks.

Step 3. Release letters-figures clutch and rotate mainshaft until in figures.

NOTE

> The printer should now be in upper case blanks. A dash (-) will be positioned in front of hammer face when in upper case blanks.

Step 4. Loosen screw on recognition arm assembly.

Step 5. Adjust recognition arm assembly so that its tab holds the blank sensing finger away from function bar when in upper case blanks.

Step 6. Tighten screw on recognition arm assembly when blanks sensing finger is held away from contact by function bar.

Step 7. Release print function clutch and rotate mainshaft a number of times while checking that blanks sensing finger is not actuated by function bar.

NOTE

> A dash (-) should be printed each time print function clutch is released and rotated through its cycle (by rotating mainshaft).

Step 8. Release letters-figures clutch and rotate mainshaft while checking to be sure that blanks symbol (when in letters) is not printed.

NOTE

> In letters, the symbol for blanks should not print and there should be no advancing.

Step 9. Repeat Step 4, if there is printing and advancing when in lower case (letters) blanks.

(21) FUNCTION ADVANCE PREVENTION ADJUSTMENT. - This adjustment prevents type cylinder from advancing or back-spacing when functions; blank (13, Figure 5-71), line feed (12), figures (11), bell (10), and letters (9) are selected.

Step 1. Using a hex wrench, back out all the advance prevention bail screws (turn screws counterclockwise) (9 through 13, Figure 5-71) until only a few threads are holding screws in advance prevent bail (1).

Step 2. Check for 1/32 inch clearance between advance prevention lever (9, Figure 5-48) and advance feed pawl (1). If 1/32 inch clearance is not present perform steps 1 through 7 of carriage return adjustment, Paragraph 5-5e(9).

Step 3. Transmit "blanks" to printer and gradually turn blank advance prevention adjustment screw (13, Figure 5-71) clockwise until advance is suppressed (Remove wrench when checking for advance suppression).

Step 4. Check wrench position, and then continue to turn wrench clockwise (counting the number of turns) until backspacing of type cylinder occurs.

Step 5. Back out blanks advance prevent adjustment screw (13) 1/2 the number (or fraction) of turns required to obtain backspacing of type cylinder in Step 4.

NOTE

> Blanks prevent adjustment screw is now positioned at midpoint between backspacing and advancing.

Step 6. Transmit blanks and check for advance prevention, with no backspacing.

NOTE

> Advance should be prevented as well as backspacing.

Step 7. Repeat Steps 3 through 6, adjusting the advance prevention adjustment screws for line feed (12), figures (11), bell (10), and letters (9).

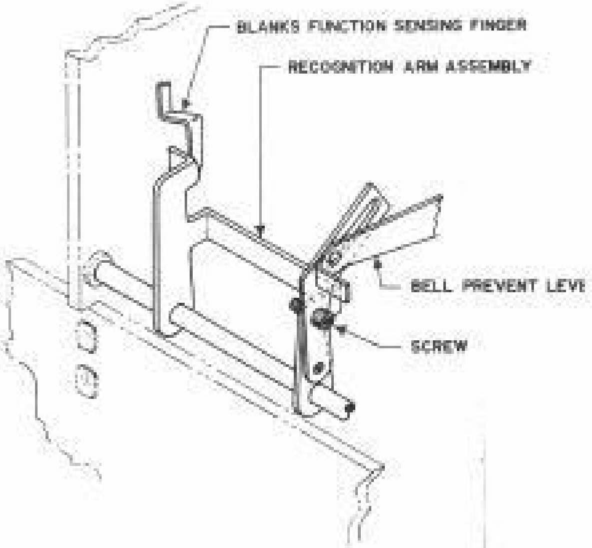


Figure 5-70. Printing on Upper Case Blanks Adjustment

(22) BOUNCE PREVENT ADJUSTMENT. - Bounce prevent adjustment is performed as follows:

NOTE

> Check to see if bounce prevent adjustment is in compliance with requirements in Steps 1 and 2. If requirements are not met, perform the following adjustment sequence.

Step 1. Depress carriage return lever (7, Figure 5-71) and observe that carriage return occurs.

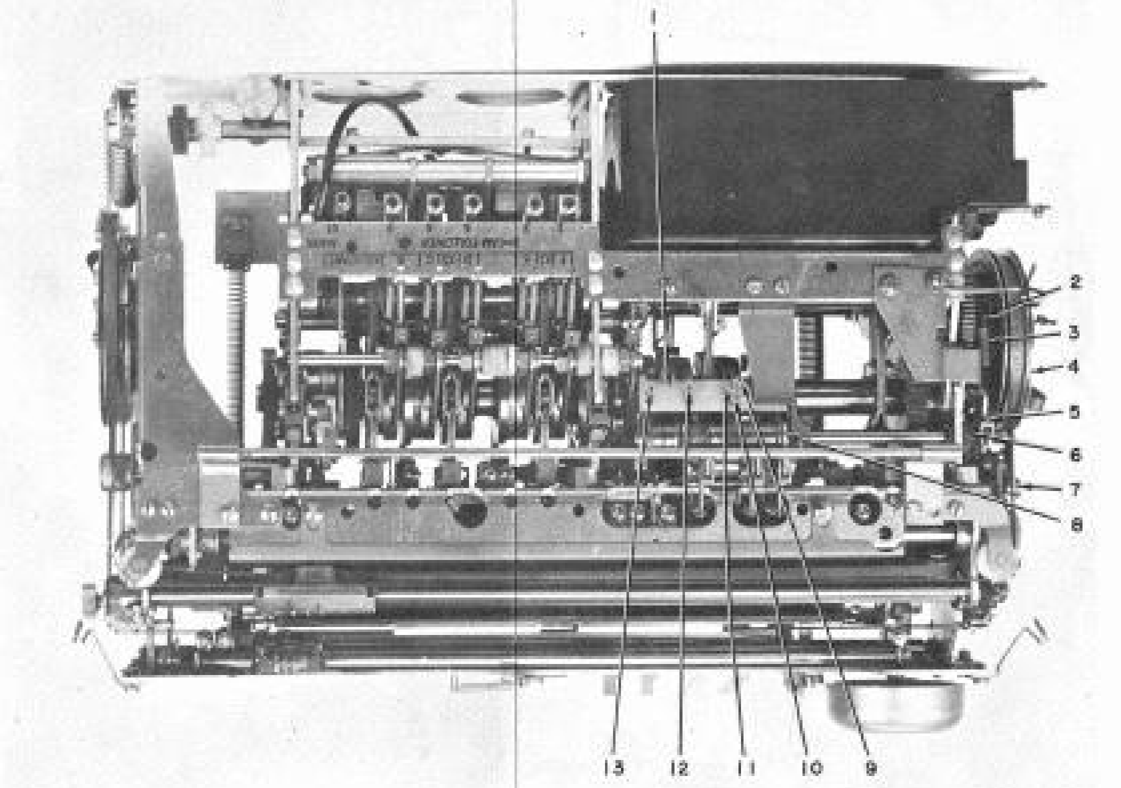
Step 2. Turn advance drum (4) counterclockwise for approximately seven spaces (characters) and observe that bounce prevent lever (3) rises and then falls so that the first tooth of the bounce prevent lever is in the notch in V-lever (2) with a slight backward movement of the V-lever.

Step 3. If first tooth of bounce prevent lever does not engage notch in V-lever or causes movement of V-lever when it does engage, loosen bounce lever eccentric clamp screw (5).

Step 4. Adjust bounce prevent lever eccentric (6) until engagement of bounce prevent lever (3) first tooth and notch in V-lever (2) cause a minimum amount of movement (slight movement backward) of V-lever when advance drum is rotated counterclockwise.

Step 5. Tighten bounce prevent lever eccentric clamp screw (5).

Step 6. Depress carriage return lever (7) for carriage return and advance by turning advance drum (4) counterclockwise a number of times while checking bounce prevent adjustment (engagement of first tooth of bounce prevent lever should cause a slight backward movement in V-lever.



KEY	ITEM
1	Advance Prevent Bail
2	V-Lever
3	Bounce Prevent Lever
4	Advance Drum
5	Bounce Prevent Lever Eccentric Clamp Screw
6	Bounce Prevent Lever Eccentric
7	Carriage Return Lever
8	Carriage Return Cam Follower
9	Letters Advance Prevent Adjustment Screw
10	Bell Advance Prevent Adjustment Screw
11	Figures Advance Prevent Adjustment Screw
12	Line Feed Advance Prevent Adjustment Screw
13	Blank Advance Prevent Adjustment Screw

Figure 5-71. Advance Prevent and Bounce Prevent Adjustments

(23) FIRST CHARACTER SPACING ADJUSTMENT. - Spacing of first two characters in a line is adjusted by first character adjustment acrew (1, Figure 5-72), located in carriage return V-lever (2). This screw determines exact relationship of advance feed pawl to ratchet.

NOTE

Check first character spacing adjustment is in compliance with requirements established in Step 1. If requirements are not met, perform following adjustment sequence.

Step 1. Using keyboard, transmit the following in the order shown:

1. Carriage Return
2. Line Feed
3. MMMMMMMMM

NOTE

Spacing of the letter M should be even. If the spacing is uneven, refer to following steps.

Step 2. Loosen hammer stop (clamp) screw and slide hammer stop and four felt washers to extreme left on hammer shaft.

Step 3. Remove printer from chassis and stand printer on its backplate.

Step 4. If first two M's are too close together, such as MM MMM, turn first character adjustment screw (1) counterclockwise until spacing is the same as the last two M's typed.

Step 5. If the first two M's are too far apart, such as M MMMM, turn first character spacing screw (1) clockwise, until spacing is the same as the last two "M's".

Step 6. When first character screw has been adjusted for optimum spacing of first two characters, tighten locknut.

NOTE

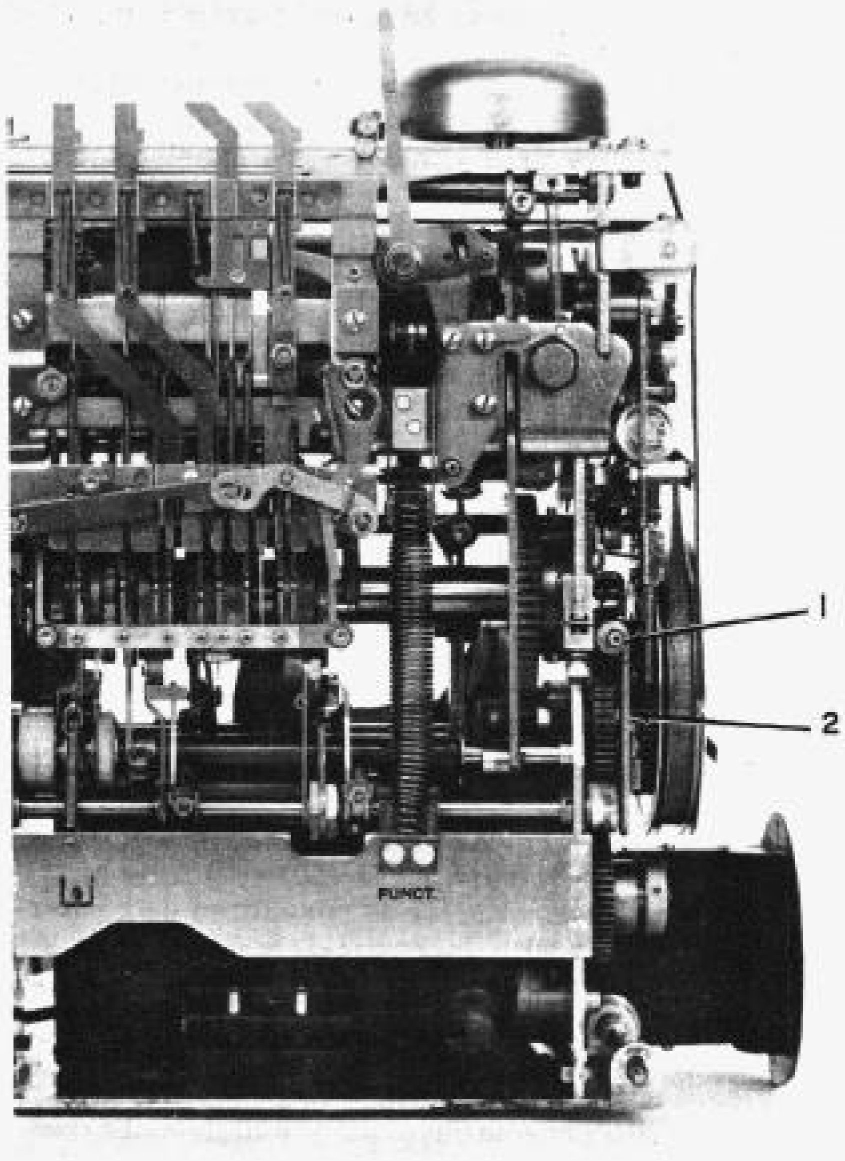
Adjustment of first character spacing screw (1) should always be checked if there is not character advance at beginning of a line following receipt of a transmitted signal. It may be necessary to recheck carriage return lock lever, and anti-bounce adjustment.

Step 7. With hammer in first character position, slide four felt washers (pushed to left on hammer shaft in Step 2) to the right and against hammer bracket.

Step 8. Slide hammer stop (clamp) to right on hammer shaft until four felt washers are held in position without the washers being compressed between hammer bracket or hammer stop (clamp).

NOTE

Positioning four felt washers (as described in Steps 7 and 8) permits carriage return to first character position and reduces hammer bracket overtravel.



KEY	ITEM
1	First Character Adjustment Screw
2	V-Lever

Figure 5-72. Spacing of the First Character

(24) KEYBOARD INTERLOCK ADJUSTMENTS
(a) PRELIMINARY CHECK OF KEYBOARD

NOTE

Check that keyboard meets with requirements established in following steps. If requirements are not met, perform a check of each of the adjustment sequences beginning with Paragraph 5-5e(24)(b).

CAUTION

TURN OFF MOTOR SWITCH BEFORE REMOVING KEYBOARD TO PREVENT DAMAGE TO GEARS.

Step 1. Remove keyboard from electrical chassis. Refer to Paragraph 5-5b(7).

Step 2. Visually check keyboard for obvious mechanical defects.

Step 3. Clean keyboard slip contacts and, if necessary, carefully bend keyboard slip contacts upward to improve their contact with chassis block contacts.

Step 4. Insert keyboard into electrical chassis.

Step 5. Switch teletypewriter set to Mode 1 (Refer to Paragraph 2-92).

Step 6. Check printer range, refer to Paragraph 3-5b. If printer accepts the message transmitted by keyboard with a minimum of 70 points of range, keyboard is properly adjusted. If total points of range is less than 70 points, proceed with adjustment sequences starting with Paragraph 5-5e(24)(b), and perform each adjustment in sequence prior to rechecking performance.

(b) **KEYBOARD CLUTCH AND INTERLOCK SOLENOID ADJUSTMENT.** - Adjustment of keyboard interlock mechanism is performed as follows:

Step 1. Rotate keyboard clutch and cam assembly (6, Figure 5-73) until prevent lever (4) is on the high of its cam.

Step 2. Loosen release lever (10) clamp screw.

Step 3. Rotate release lever (10) eccentric on bail shaft until release lever is positioned under prevent lever tab (11) with approximately 0.002 to 0.005 inch clearance between prevent lever tab (11) and release lever (View D-D).

Step 4. Tighten release lever (10) clamp screw when clearance is established.

Step 5. With prevent lever on the high of its cam, loosen eccentric pin lock nut (15).

Step 6. Hold clutch release lever (3) against keyboard clutch and cam (6) and simultaneously adjust prevent lever eccentric pin (15) until 0.002 to 0.005 inch clearance is established between prevent lever eccentric pin and clutch release lever (View C-C).

Step 7. Tighten eccentric pin lock nut (15) when clearance is established.

Step 8. Loosen release pin eccentric (16) bushing clamp screw (View A-A).

Step 9. Slide eccentric bushing (16) to the left until 0.002 to 0.005 inch clearance is established between clutch release lever (3) and eccentric bushing (16, View B-B).

Step 10. Tighten release pin eccentric (16) bushing clamp screw when clearance is established.

Step 11. Loosen solenoid bracket (1) mounting screws.

Step 12. Hold solenoid plunger against its seat in solenoid and simultaneously position entire solenoid and mounting bracket assembly (1) so that end of release pin (2) is flush with or slightly below left face of eccentric bushing (16).

Step 13. Tighten solenoid mounting bracket screw near (coil) release pin spring (14).

Step 14. Slide leaf spring (17) to left until it makes contact with extension of solenoid and continue pushing leaf spring to left an additional 1/32 inch (after contacting solenoid extension). This provides a preload tension on leaf spring (17).

Step 15. Adjust leaf spring so that threaded portion of solenoid plunger rod (18) is allowed to pass freely through slot in leaf spring.

Step 16. Tighten (leaf spring) solenoid bracket screws.

Step 17. Loosen solenoid stroke adjustment nut (19) so that solenoid plunger has a maximum forward of 3/64 inch.

NOTE

Release pin (2) should now engage at least one half the thickness of clutch release lever (3). If this requirement is not met, recheck Steps 10, 11, and 12.

Step 18. Manually hold solenoid plunger in its seated (energized) position and simultaneously adjust leaf spring adjustment nut (20) so that leaf spring is deflected approximately 1/32 inch.

Step 19. Tighten leaf spring adjustment nut (20), lock nut.

Step 20. Rotate keyboard clutch to stop position. (Clutch release lever holding against the clutch tab).

Step 21. Loosen release pin eccentric bushing (16) clamp screw.

Step 22. Rotate eccentric bushing until there is a 0.005 to 0.010 inch clearance between lower edge of the clutch release lever and top of release pin (View A-A).

Step 23. Tighten release pin eccentric bushing clamp screw (View A-A).

Step 24. Loosen clutch release cam follower eccentric lock nut (21) while keyboard clutch is still in stop position.

Step 25. Adjust clutch release cam follower eccentric (21) so that a minimum amount of follower (7) travel is required to pull release lever (10) out from under the prevent lever tab (11) when a key is depressed.

Step 26. Tighten clutch release cam follower eccentric lock nut.

Step 27. Loosen repeat arm clamp screw (22).

NOTE

Repeat key is normally disabled when keyboard interlock mechanism is in use. Repeat key stop (12) must be disengaged from under repeat key lever in key guide (23) before performing Step 27. Refer to Paragraph

5-5e(22)(b) and reverse repeat key disabling procedure.

Step 28. Position repeat arm (22) against actuate lever (8), with repeat key depressed, until release lever (10) is tripped out from under tab (11) on prevent lever (4).

Step 29. Tighten repeat arm clamp screw.

NOTE

Repeat key must be disabled after performing Steps 27 and 28. Refer to Paragraph 5-5e(24)(c) for repeat key disabling procedure.

(c) ENABLING KEYBOARD INTERLOCK MECHANISM. - If keyboard has been operated with interlock mechanism disabled, perform the following steps to permit operation of interlock mechanism.

Step 1. Remove keyboard from electrical chassis (Refer to Paragraph 5-5b(7)).

Step 2. Loosen adjustable solenoid stop (13, Figure 5-73), clamping screw.

Step 3. Position adjustable stop (13) on its shaft so that it does not stop action of release pin (2).

NOTE

Release pin should be able to move forward under clutch release lever (3).

Step 4. Tighten adjustable stop clamping screw when stop is correctly positioned.

Step 5. Remove screw and keyboard right side rear cover.

Step 6. Loosen repeat key stop (12) clamp screw.

Step 7. Slide repeat key stop (12) forward so that its extension is between bottom of repeat key lever and key lever guide (23).

Step 8. Tighten repeat key stop clamp screw.

NOTE

Steps 5 through 8 disable repeat key. Repeat key should be disabled whenever keyboard interlock mechanism is in use.

Step 9. Replace keyboard right side rear cover.

Step 10. Replace keyboard in electrical chassis (Refer to Paragraph 5-5b(8)).

(d) DISABLING KEYBOARD INTERLOCK MECHANISM. - Keyboard interlock mechanism may be disabled to permit use of keyboard without receipt of a synchronous pulse. Procedure for disabling keyboard interlock mechanism is as follows:

Step 1. Remove keyboard from electrical chassis (Refer to Paragraph 5-5b(7)).

Step 2. Loosen adjustable solenoid stop (13, Figure 5-73) clamping screw.

Step 3. Position adjustable stop against shoulder on release pin (2) so that release pin is held even with or slightly below left face of eccentric bushing (16).

Step 4. Tighten adjustable stop clamping screw when release pin is held within bushing (16).

NOTE

Steps 1 through 4 disable interlock solenoid. The keyboard interlock solenoid should not be disabled without specific authorization to do so.

Step 5. Remove screw and keyboard right side rear cover.

Step 6. Loosen repeat key stop (12) clamp screw.

Step 7. Slide repeat key stop (12) to rear, disengaging its extension from between bottom of repeat key lever and key lever guide (23).

Step 8. Tighten repeat key stop clamp screw.

NOTE

Steps 5 through 8 enable repeat key. Repeat key is disabled when keyboard interlock mechanism is operating.

Step 9. Replace keyboard right side rear cover.

Step 10. Replace keyboard in electrical chassis (Refer to Paragraph 5-5b(8)).

(d) LATERAL POSITION AND CLEARANCE OF BACKSTOP.

Step 1. Loosen hex-head setscrew in the keyboard frame that secures clutch backstop shaft (See Figure 5-74).

Step 2. Position backstop eccentric shaft so that backstop rests on center of clutch housing.

Step 3. Tighten hex-head setscrew in keyboard frame just enough to prevent lateral movement of eccentric shaft.

Step 4. Adjust backstop eccentric so that motion of backstop sliding to bottom of backstop notch, causes clutch housing to backup slightly.

Step 5. Manually rotate keyboard clutch and check that backstop slides to bottom of its notch, moving clutch housing back slightly.

NOTE

Backward motion of clutch housing ensures that clutch rollers are fully disengaged from drive shaft.

(e) KEYBOARD RAILS SPACING. - If keyboard rails (located on top of keyboard) are loosened or removed, adjust spacing between rails as follows:

Step 1. Loosen screws on the right rail.

NOTE

If a ruler is available, rails should be spaced 8-5/16 inches apart. If no ruler is available proceed with Step 2.

Step 2. Loosen and remove screws on key locking strip (located on back of keyboard) and remove locking strip.

Step 3. Position locking strip between two rails as a clearance gage so that locking strip is against left rail.

Step 4. Move right rail so that it just contacts locking strip at both front and rear of rails; secure rails in this position and reinstall locking strip in its correct position.

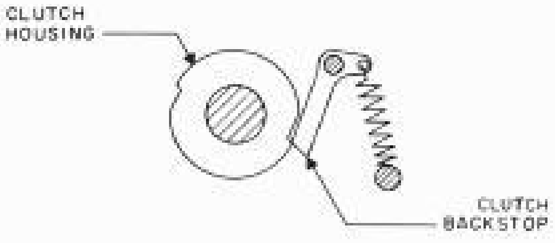


Figure 5-74. Backstop Eccentric Adjustment

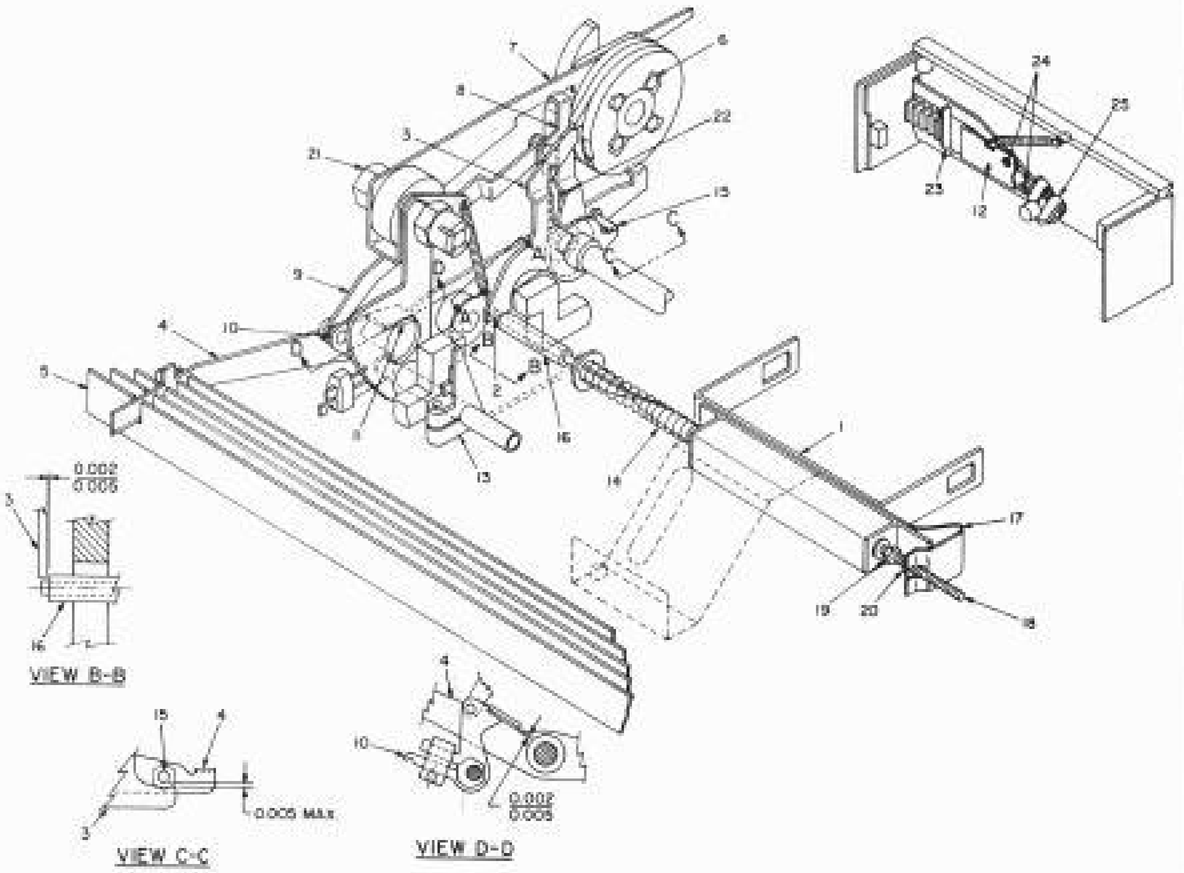


Figure 5-73. Keyboard Interlock Mechanism

KEY	ITEM
1	Solenoid and Bracket Assembly
2	Release Pin
3	Clutch Release Lever Assembly
4	Prevent Lever Assembly
5	Code Bars
6	Keyboard Clutch and Cam Assembly
7	Clutch Release Cam Follower
8	Actuate Lever Assembly
9	Release Lever Link Assembly
10	Release Lever Assembly
11	Prevent Lever Tab
12	Repeat Key Stop
13	Solenoid Stop Assembly
14	Release Pin Spring
15	Prevent Lever Eccentric Pin
16	Eccentric Bushing
17	Leaf Spring
18	Solenoid Plunger Rod
19	Solenoid Stroke Adjustment Nut
20	Leaf Spring Adjustment Nut
21	Clutch Release Cam Follower Eccentric
22	Repeat Actuate Arm Assembly
23	Key Lever Guide
24	Slotted Head Screws (Repeat Key Lever)
25	Clamp Screw

(f) CODE BAR-PULSING FINGER CLEARANCE. - Code bar pulsing finger clearance is preset at factory and should be performed only if code bar guide and code pulsing finger assemblies have been removed or replaced.

Step 1. See Figure 5-75, Detail B. Depress blank key to slide all code bars to left and check for 0.005 to 0.010 inch clearance between code bars and pulsing fingers.

Step 2. Repeat Step 1 for remaining code bars and pulsing fingers, rotating keyboard clutch to select pulsing fingers. If clearance between code bars and pulsing fingers is not 0.005 to 0.010 inch proceed with Step 3.

Step 3. Remove two shaft clamp screws, clamps, shims, and pulsing finger assembly from keyboard frame, taking care to keep same clamps and shims together (also remember keyboard frame notch location in frame for clamps and shims).

Step 4. Add to or take away shims from under shaft clamps to establish 0.005 to 0.010 inch clearance between code bars and pulsing fingers (adding shims decreases clearance and removing shims increases clearance).

NOTE

Each shim is 0.002 inches thick and removal or addition or more shims under one clamp than the other will cause misalignment of code pulsing finger shaft and code pulsing cam assembly.

Step 5. Replace pulsing finger assembly, shaft clamps, shims, and secure with clamp screws.

Step 6. Repeat Step 1 to check for 0.005 to 0.010 inch clearance between code bars and pulsing fingers.

NOTE

Code pulsing contact clearance adjustment must be performed (Paragraph 5-5e(24)(g)) if shims were removed or added under pulsing finger shaft clamp. (Code bar-pulsing finger clearance.)

(g) CODE PULSING (READOUT) CONTACT CLEARANCE ADJUSTMENT. - Keyboard adjustments clearances have been preset at factory. Only if replacement of code pulsing contacts is required or distortion from keyboard becomes excessive should code pulsing contact clearance require adjustment.

Step 1. Position keyboard as shown in detail A, (Figure 5-75) and note location of code pulsing contacts.

Step 2. Depress blank key and manually rotate keyboard drive gear until first contact (start stop) opens and its pulsing finger is on the high side of the cam.

Step 3. Using a screwdriver or contact bender adjust contacts by carefully bending bottom contact leaf or bottom contact leaf stiffener for a clearance of 0.020 to 0.025 inch.

Step 4. Continue to rotate keyboard drive gear until the low side of the cam is opposite number 1 pulsing finger; adjust contact clearance for 0.015 to 0.020 inch (Detail C); repeat this procedure for number 2 through number 5 pulsing fingers.

Step 5. Depress letters key and manually rotate keyboard drive gear until number 1 pulsing finger drops off high side of cam (Detail D); check for a clearance between pulsing finger pusher and top contact leaf of 0.010 inch (minimum); repeat this procedure for number 2 through 5 pulsing fingers. If clearance is incorrect, check condition of the cam, pulsing fingers, code bars, and associated mechanism.

(h) CODE PULSING CONTACT TENSION. - Check that pressure required to open a closed set of code pulsing contacts (Figure 5-75, Detail D) is 3 to 4 ounces.

(i) MASTER PULSING CONTACT ADJUSTMENT. - Position keyboard clutch in stop position, and perform master pulsing contact adjustment as follows:

Step 1. Using special internal-hex 1/16 inch wrench turn upper and lower leaf adjusting screws (Figure 5-75) counterclockwise until leaf contacts do not make contact.

Step 2. Turn upper leaf adjusting screw clockwise until leaf contacts make contact and continue turning screw 1/8 turn past this point.

Step 3. Depress any key to release keyboard clutch.

Step 4. Rotate keyboard clutch slowly until master pulsing cam follower (first cam follower near outside frame wall) is on the low if its cam (centered in the low of the stop).

Step 5. Turn lower leaf adjusting screw clockwise until leaf contacts make contact and continue turning screw 1/8 turn past this point.

Step 6. Replace keyboard in chassis.

Step 7. Turn teletypewriter on and type a series of R's using REP key.

Step 8. If machine runs open, upper leaf adjusting screw is not in far enough. If letter V prints, upper leaf adjusting screw is too far in.

Step 9. Type a series of Y's using REP key. If letters is selected and Y does not print, lower leaf adjusting screw is too far in.

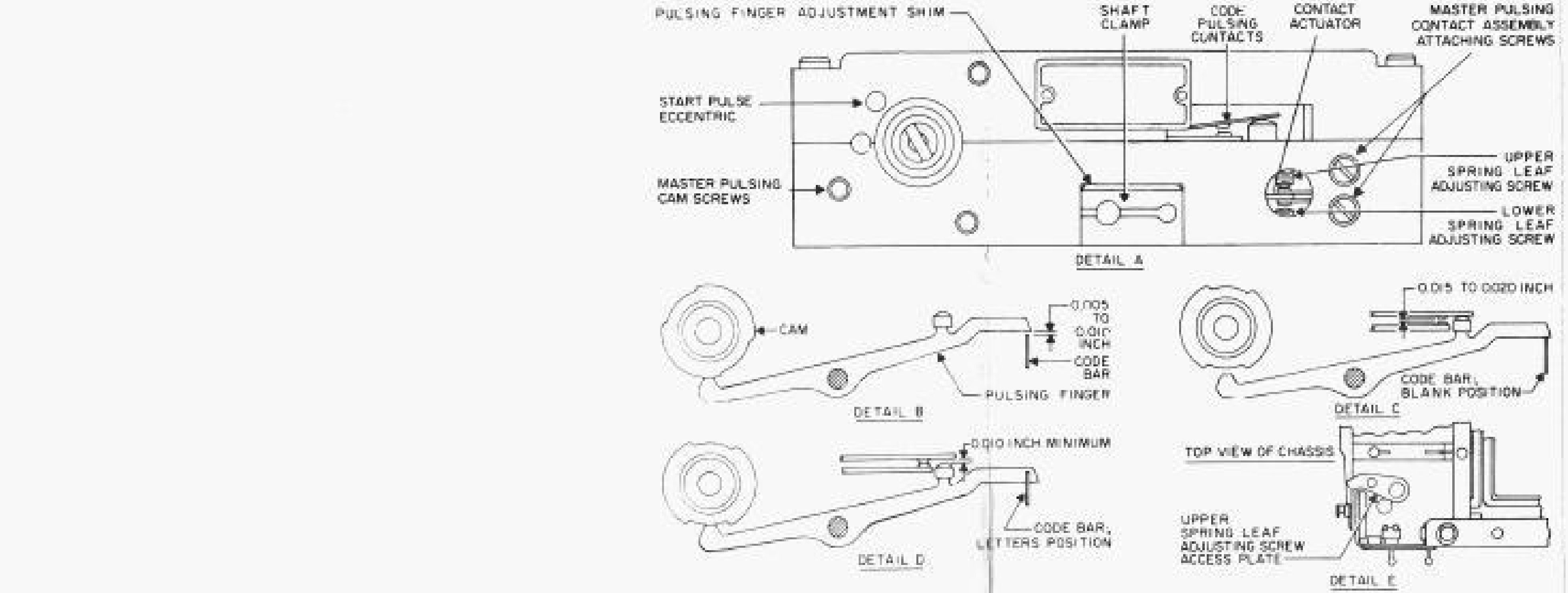

PULSING FINGER ADJUSTMENT SHIM
SHAFT CLAMP
CODE PULSING CONTACTS
CONTACT ACTUATOR
MASTER PULSING CONTACT ASSEMBLY ATTACHING SCREWS
START PULSE ECCENTRIC
MASTER PULSING CAM SCREWS
UPPER SPRING LEAF ADJUSTING SCREW
LOWER SPRING LEAF ADJUSTING SCREW
DETAIL A
CAM
0.005 TO 0.010 INCH
CODE BAR
PULSING FINGER
DETAIL B
0.015 TO 0.020 INCH
CODE BAR, BLANK POSITION
DETAIL C
0.010 INCH MINIMUM
CODE BAR, LETTERS POSITION
DETAIL D
TOP VIEW OF CHASSIS
UPPER SPRING LEAF ADJUSTING SCREW ACCESS PLATE
DETAIL E

Figure 5-75. Keyboard Adjustment, Parts Location

(j) KEYBOARD SLIP CONNECTOR CONTACT ADJUSTMENT. - The six keyboard slip connector contacts (leaf contacts located on top of keyboard) which engage contacts in chassis contact block should be adjusted only if transmission from the keyboard is erratic or not possible. The keyboard slip connector contacts should be adjusted as follows:

Step 1. Remove keyboard from chassis following procedure in Paragraph 5-5b(7).

Step 2. Bend five of the six keyboard slip connector contacts (numbers 2 through 6) slightly upward to assure contact with chassis contact block contact.

Step 3. Bend number 1 keyboard slip connector contact (first leaf contact on right as viewed from operator's position) approximately 1/32 inch higher than the other five keyboard slip connector contacts (contacts bent in Step 2).

Step 4. Install keyboard in electrical chassis following procedure in Paragraph 5-5b(8)

(25) OSCILLOSCOPE ADJUSTMENT OF MASTER PULSING CONTACTS. - Ensure that master pulsing contact assembly has been centered (Paragraph 5-4e, Steps 13 and 14) prior to performing this adjustment.

Step 1. Remove electrical chassis from case (Paragraph 5-5b(3)).

Step 2. Switch teletypewriter to Mode 1 (line battery supplied internally).

Step 3. Connect Oscilloscope AN/USM-105, or equivalent, across cathode of VR1 and test point 3 of electronic module and disconnect selector plug.

Step 4. Locate lower spring leaf adjusting screw (Figure 5-75, Detail E) directly under upper spring leaf adjusting screw; insert insulated 1/16 inch internal-hex wrench (supplied in Tool Kit TK-122/U) through split rubber cover into lower spring leaf adjusting screw; transmit letter Y using REP key and turn lower spring leaf adjusting screw counterclockwise until letter Y is no longer transmitted.

Step 5. Open upper spring leaf adjusting screw access plate (Figure 5-75, Detail E); insert special wrench between ribbon roller and printer front plate into upper spring leaf adjusting screw and turn screw counterclockwise until printer runs open.

Step 6. Transmit a series of R's using REP key. Turn upper spring leaf adjusting screw clockwise until waveform on the oscilloscope shows a mark pulse on pulses 2, 4, and stop, and space pulses on start, 1, 3, and 5 as shown in waveform A, Figure 5-76. When screw first comes in contact with pulsing finger, waveform B will appear. Further clockwise rotation of screw will produce waveform A; if screw is turned too far in, waveform C will appear.

Step 7. Transmit a series of Y's using REP key. Turn lower spring leaf adjusting screw clockwise until waveform shows mark pulses on 1, 3, and 5, and stop, and space pulses on start, 2 and 4 as shown in waveform A, Figure 5-77. Waveform B shows lower spring leaf adjusting screw too far out, waveform C shows lower spring leaf adjusting screw approaching proper adjustment, and waveform D shows lower spring leaf adjusting screw too far in.

Step 8. Transmit LTRS using REP key. Oscilloscope waveform should appear as shown in waveform A, Figure 5-78. Readjust upper and lower adjusting screws slightly for minimum width and height of the pips. Transmit R's if lower screw is properly adjusted and upper screw is in too far, waveform B will appear. Transmit Y's if upper spring leaf adjusting screw is properly adjusted and lower spring leaf adjusting screw is in too far, waveform C will appear. (Connect selector plug.)

Step 9. Before proceeding with Step 12, check speed change gear being used in the equipment. Refer to Paragraph 2-11 for speed change gear replacement and install 100-word per minute (white) gear. Refer to Figure 5-79 for proper length of start pulse of speed change gear being used.

Step 10. Using a convenient time base on oscilloscope, note length of start pulse (first spacing pulse); this start pulse should appear as shown in Figure 5-79. Operating on 7.42-unit code and 100 words per minute, pulse length should be 13.49 milliseconds (or 22 milliseconds at 60 words per minute). If pulse lengths are incorrect adjust pulse length as described in following steps.

NOTE

There are two alternate methods of checking start pulse length. The first method is to compare lengths of start pulse and number 1 pulse during letters condition; end of the number 1 pulse appears as a small pip in Figure 5-79. The second method is to transmit (marking on 1, 3, 4, and 5) and observe that start pulse is the same length as number 1 (mark) and number 2 (space) pulses.

Step 11. Locate start pulse eccentric screw (Figure 5-80) in master pulsing cam and rotate pulsing cam assembly until this start pulse eccentric is aligned with top adjustment hole in keyboard frame; check that a screw is aligned with bottom hole.

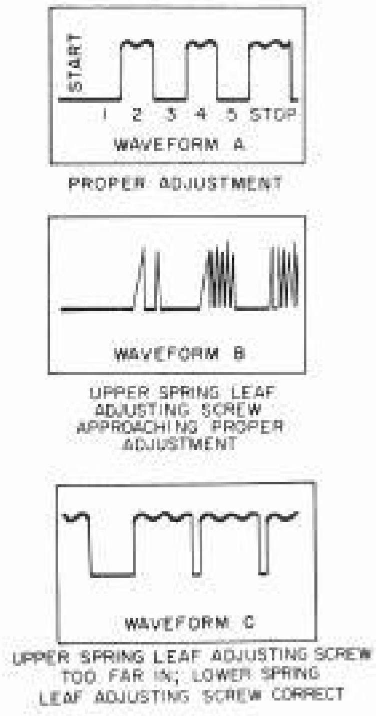
NOTE

Do not loosen or move either eccentric or screw yet.

Step 12. Rotate pulsing cam assembly until second screw appears in one of adjustment holes; loosen this screw by inserting an internal hex wrench through hole in frame. Rotate cam assembly until third screw appears in one of adjustment holes; loosen screw.

Step 13. Rotate pulsing cam assembly until the start pulse eccentric again appears in bottom hole. Insert an internal hex wrench through bottom hole and loosen third screw.

Step 14. If start pulse must be lengthened, turn start pulse eccentric in a manner that will retard master pulsing cam in relation to start-stop cam. These cams move clockwise when viewed from left side of keyboard. If start pulse must be shortened, advance (clockwise) relative position of master pulsing cam with start-stop cam.

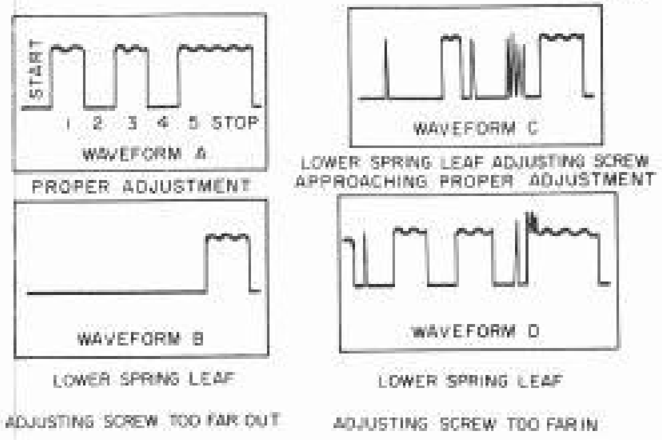


PROPER ADJUSTMENT

UPPER SPRING LEAF ADJUSTING SCREW APPROACHING PROPER ADJUSTMENT

UPPER SPRING LEAF ADJUSTING SCREW TOO FAR IN; LOWER SPRING LEAF ADJUSTING SCREW CORRECT

Figure 5-76. Waveforms for Transmitting Letters R



PROPER ADJUSTMENT

LOWER SPRING LEAF ADJUSTING SCREW TOO FAR OUT

LOWER SPRING LEAF ADJUSTING SCREW APPROACHING PROPER ADJUSTMENT

LOWER SPRING LEAF ADJUSTING SCREW TOO FAR IN

Figure 5-77. Waveforms for Transmitting Letters Y

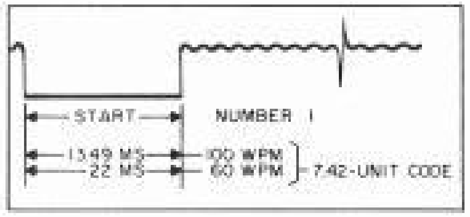
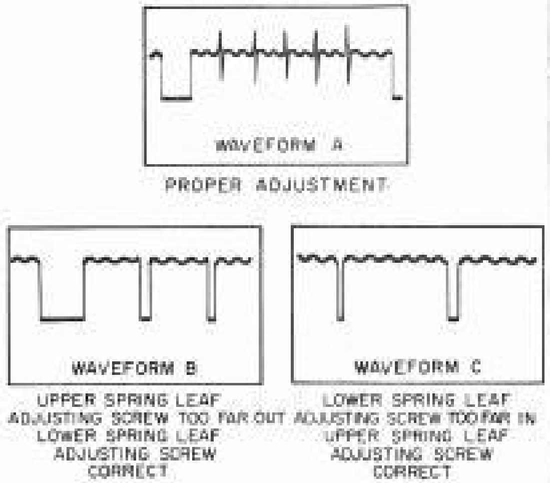


Figure 5-79. Waveform for Timing Adjustment



PROPER ADJUSTMENT

UPPER SPRING LEAF ADJUSTING SCREW TOO FAR OUT LOWER SPRING LEAF ADJUSTING SCREW CORRECT

LOWER SPRING LEAF ADJUSTING SCREW TOO FAR IN UPPER SPRING LEAF ADJUSTING SCREW CORRECT

Figure 5-78. Waveforms for Transmitting Letters (LTRS)

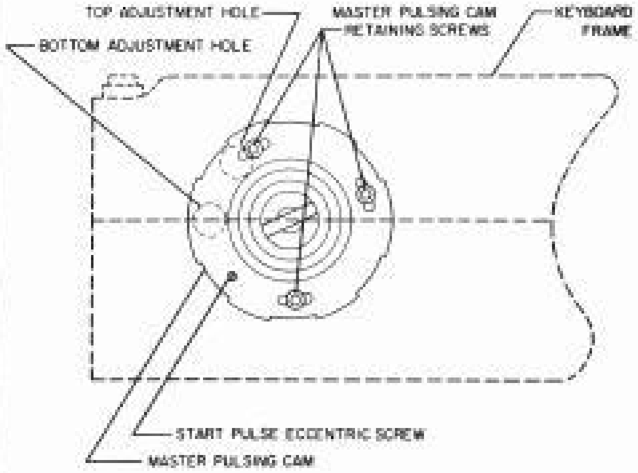


Figure 5-80. Keyboard Timing Adjustment

(26) FIELD ADJUSTMENT OF KEYBOARD.

(a) CODE PULSING (READOUT) CONTACT CLEARANCE. - Ensure that master pulsing contact assembly has been centered, (Steps 11 and 12) prior to performing this adjustment.

Step 1. Position keyboard as shown in Detail A, Figure 5-75 and note location of code pulsing contacts.

Step 2. Depress blank key and manually rotate keyboard drive gear until first contact (start stop) opens and its pulsing finger is on the high side of the cam.

Step 3. Using a contact bender, adjust contacts by carefully bending bottom contact leaf or bottom contact leaf stiffener for a clearance of 0.020 to 0.025 inch.

Step 4. Continue rotating keyboard drive gear until the low side of the cam is opposite number 1 pulsing finger; adjust contact clearance for 0.015 to 0.020 inch (Figure 5-75, Detail C); repeat this procedure for number 2 through number 5 pulsing fingers.

Step 5. Depress letters key and manually rotate keyboard drive gear until number 1 pulsing finger drops off the high side of the cam (Figure 5-75, Detail D); check for a clearance between pulsing finger pusher and top contact leaf of 0.010 inch (minimum); repeat this procedure for number 2 through number 5 pulsing fingers. If clearance is incorrect, check condition of cam, pulsing fingers, code bars, and associated mechanism.

(b) MASTER PULSING CONTACTS. - The following procedures will place keyboard contacts in nearly perfect alignment. For further refinement of adjustment, perform oscilloscope adjustment procedure in Paragraph 5-5e(23).

Step 1. Loosen three master pulsing cam retaining screws (Figure 5-75).

NOTE

> Master pulsing cam must be rotated in small increments, aligning master pulsing cam retaining screws with adjustment hole in side of keyboard frame. When a retaining screw is aligned with adjustment hole, insert an allen wrench into hole and loosen retaining screw.

Step 2. Align start pulse eccentric screw with one of the adjustment holes, insert a small screwdriver and rotate screw until three retaining screws are in approximate center of their slots.

Step 3. Retighten three master pulsing cam retaining screws.

Step 4. Depress BLANK key and manually rotate keyboard drive gear until master pulsing cam follower drops to the first low on master pulsing cam. Check to see that number 1 pulsing finger contact is open.

NOTE

> If master pulsing contact assembly has been removed from frame, proceed with Step 5 through 10. If master pulsing contact assembly has not been dismantled from the keyboard frame, proceed with Steps 11 through 26.

Step 5. Loosen master pulsing contact actuator retaining screw and pivot actuator (see Figure 5-75) off to the side.

Step 6. Back out upper and lower spring leaf adjusting screws on replacement contacts using special internal-hex 1/16 inch wrench (supplied in Teletypewriter Maintenance Kit. MITE Corporation P/N 7140. FSN 5815-902-3328) so that screws are just engaged in their threads.

NOTE

> Backing out screws in this manner provides maximum clearance between contacts.

Step 7. Attach replacement master pulsing contact assembly loosely to left bottom frame of keyboard using two screws and two lockwashers.

NOTE

> When mounting master pulsing contact assembly, align contact with center line of the master pulsing cam follower.

Step 8. Spread upper and lower leaf contacts apart just enough to insert contact actuator between leaf contacts: tighten master pulsing cam follower screw.

Step 9. Place a shim (0.010 inch for six-leaf master pulsing contact assembly or 0.005 inch for two-leaf master pulsing contact assembly between tip of master pulsing cam follower and its cam, while on the low. This establishes midway point of travel of master pulsing cam follower.

Step 10. Loosen two master pulsing contact attaching screws and move entire master pulsing contact assembly into position so that keyboard contact actuator is pointing at center insulator, and upper and lower leaf contact assemblies are parallel to keyboard contact actuator, tighten two screws and remove shim.

Step 11. Connect an ohmmeter (multimeter AN/PSM-4, or equivalent) across keyboard slip connector contacts.

Step 12. Rotate keyboard drive gear toward front until shaft rotates freely; clutch will then be in stop position.

Step 13. Depress letter A and turn keyboard over with space bar toward you.

Step 14. Observe pulsing fingers (Figure 5-75, Detail B) from right to left; note that first one is master pulsing cam follower and second one is start stop pulsing finger which is now resting on low side of its cam.

Step 15. Slowly rotate keyboard drive gear away from you until master pulsing cam follower is riding in center of first low part of its cam.

Step 16. Turn lower spring leaf adjusting screw (Figure 5-75, Detail A) counterclockwise until no reading (meter pointer at infinity end) is observed on ohmmeter; then turn screw clockwise until meter first reads (indicates continuity). Continue turning screw one-eighth turn past this point.

Step 17. Very carefully turn the keyboard drive gear away from you until master pulsing cam follower is riding on center of high point of its cam.

Step 18. Turn keyboard over and turn upper leaf adjusting screw (Figure 5-75) counterclockwise until no reading is observed on ohmmeter, then turn screw clockwise until ohmmeter reading is first observed and continue turning screw one-eighth turn past this point.

Step 19. Remove ohmmeter and reinsert keyboard in printer.

Step 20. Turn teletypewriter on and type a series of R's using REP key.

Step 21. Adjust printer range as instructed in Paragraph 2-8a until low end of range is found.

NOTE

> If V prints, upper spring leaf adjusting screw is in too far.

Step 22. Move range dial up ten points from low end.

Step 23. Type a series of Y's, using REP key; turn lower spring leaf adjusting screw clockwise until Y's print correctly.

NOTE

> If letters function is selected, lower spring leaf adjusting screw is in too far.

Step 24. Move range dial back to low end and type a series of R's using REP key; if V's print, upper spring leaf adjusting screw is too far in. If teletypewriter runs open upper spring leaf adjusting screw is too far out. Make indicated adjustment and verify that R's are printing correctly.

Step 25. Type a series of Y's, using REP key; if Y's print, upper spring leaf adjusting screw is too far in; if teletypewriter runs open, upper spring leaf adjusting screw is too far out. Make indicated adjustment and verify that Y's are printing correctly.

NOTE

> **When both R's and Y's are printing correctly at the low end of printer range, keyboard is correctly adjusted.**

Step 26. Reset pointer to middle of its range according to Paragraph 2-8a.

(27) PAPER BRAKE ADJUSTMENT. - Ensure that paper brake operation is in accordance with requirements established in Step 3. If requirements are not met, perform the following adjustment sequence.

CAUTION

> NEVER LIFT EQUIPMENT BY MEANS OF DANCER ROLL TUBE (PAPER BRAKE RELEASE ARM), LOCATED BETWEEN TWO BRAKE ARMS AS THIS WILL RESULT IN PERMANENT DAMAGE TO PAPER BRAKE LINK.

Step 1. Adjust two paper brake link eccentrics (Figure 5-81) so that spring end of paper brake link is located midway between two stop tabs when rubber part of brake mechanism eccentric touches flared edge of the brake drum.

NOTE

> While performing Step 1, it is important that paper brake link eccentrics be adjusted to keep dance roll tube (paper brake release arm) parallel with paper supply roll.

Step 2. Operate line feed key and observe that sufficient paper is fed for a new line.

NOTE

> **Line feed action pulls paper, pivoting dancer roll tube (paper brake release arm), paper brake links, and paper brake link eccentrics (rubber discs), releasing paper brake drums.**

NOTE

> **When sufficient paper has been released, spring biased pivoting action of paper brake assembly against paper brake drums should prevent further rotation of paper roll.**

Step 3. Attach 8 ounce spring scale to center of dancer roll tube (paper brake release arm) and check that pressure required to move it away from paper supply roll is 1-1/2 to 2 ounces. Move scale to both ends and check that pressure required to move dancer roll tube (paper brake arm) is 1/2 to 1 ounce.

NOTE

> **If requirements of Step 3 are not met, or if mechanism is binding, check for distortion or damage to dancer roll tube (paper brake release arm), brake drums, or two upright paper brake links, and replace damaged parts.**

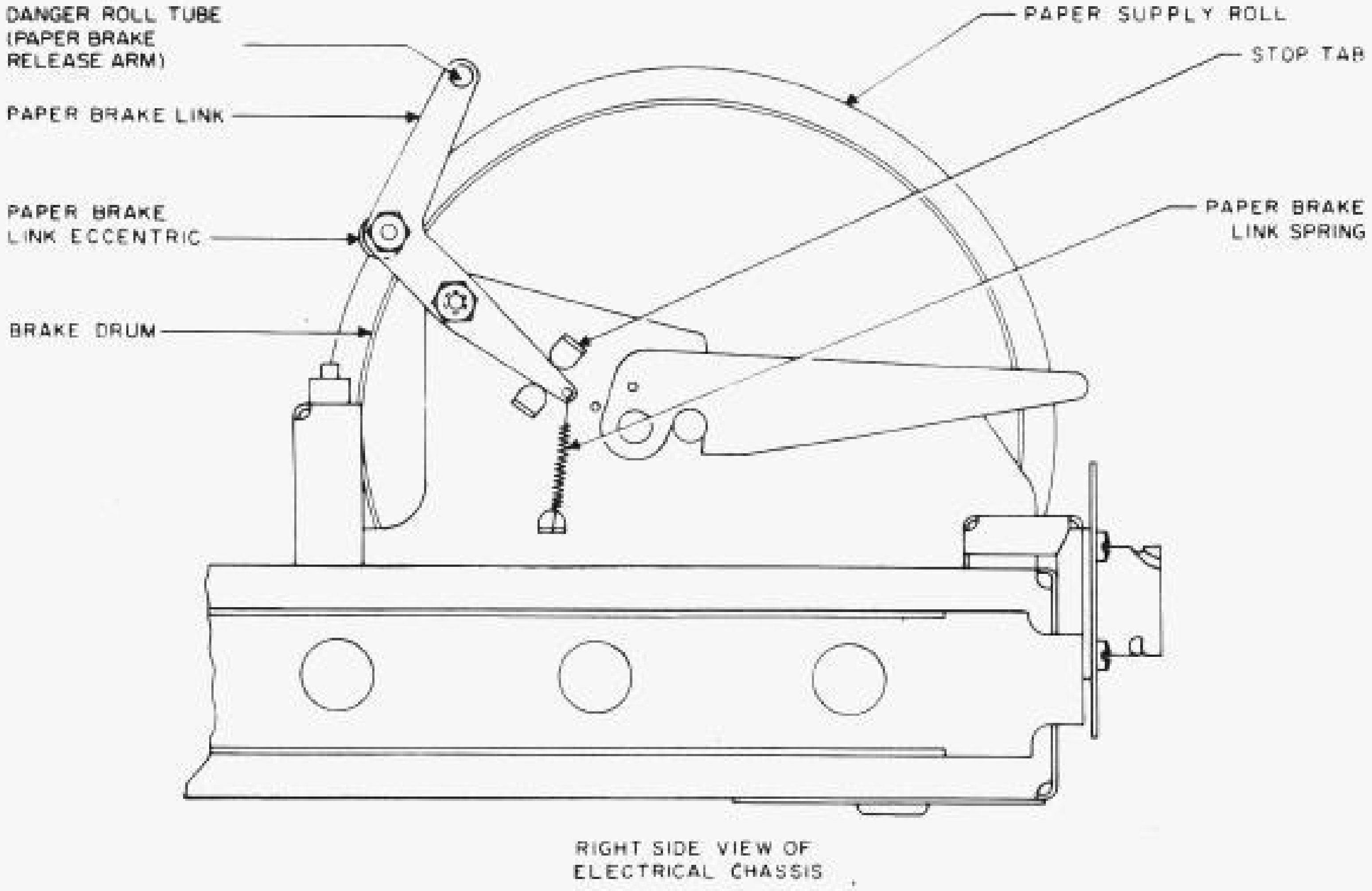


Figure 5-81. Paper Brake Adjustment, Parts Location

(28) SPROCKET FEED PAPER ADJUSTMENT.

Step 1. Check to be certain that 72 character block is installed in operating position on V lever. If block is installed, proceed with Step 7. If block is not installed, proceed with Step 2.

Step 2. Manually depress carriage return lever and observe that carriage return occurs.

Step 3. Remove retaining ring and then advance drum (with the cables attached) from right side of printer.

Step 4. Remove screw and 72 character block from stowage position on V lever.

Step 5. Position 72 character block over threaded hole in V lever (operating position is located near the tip of the "V"), and thread screw through block into V lever.

Step 6. Install advance drum on its shaft and secure it with retaining ring. Check to ensure that all cables are installed correctly.

Step 7. Depress carriage return lever and observe that carriage return occurs.

Step 8. Set printer in letters A.

Step 9. Check alignment of lateral function slide with index mark on function selector frame, and if necessary, realign lateral function slide (refer to Paragraph 5-5e(4)(b).

Step 10. Loosen lateral control belt clamp on takeup drum and allow 3/8 inch of lateral control belt to be released; then retighten lateral control belt clamp.

Step 11. Loosen lateral control belt clamp on advance drum and take up 3/8 inch of lateral control belt previously released from takeup drum; then retighten lateral control belt clamp.

Step 12. Manually rotate advance drum until two clicks are heard or felt indicating that end of line has been reached.

Step 13. Check for 1/8 inch clearance between print cylinder yoke and print cylinder shaft bearing located in right wall of frame. Proceed with Step 14 if 1/8 inch clearance is not present, and with Step 16 if 1/8 inch clearance is present.

Step 14. If 1/8 inch clearance between print cylinder yoke and print cylinder shaft bearing is not correct, loosen lateral control belt clamp on advance drum and take up or let out lateral control belt until clearance is established.

Step 15. Retighten lateral control belt clamp on advance drum when 1/8 inch clearance has been established.

Step 16. Depress carriage return lever and observe that carriage return occurs (print cylinder and hammer move to left-hand margin).

Step 17. Check for a clearance of 1/16 inch between takeup arm pulley and takeup drum circumferences.

Step 18. If 1/16 inch clearance between takeup arm pulley and takeup drum circumferences is not correct, loosen lateral control belt clamp on takeup drum and let out or take up on lateral control belt until clearance is established; retighten lateral control belt clamp on takeup drum.

Step 19. Rotate advance drum counterclockwise until print cylinder is positioned in center of line.

Step 20. Loosen hammer cable clamp and realign hammer with letter A.

Step 21. Tighten hammer cable clamp on hammer cable when hammer is correctly aligned with letter A.

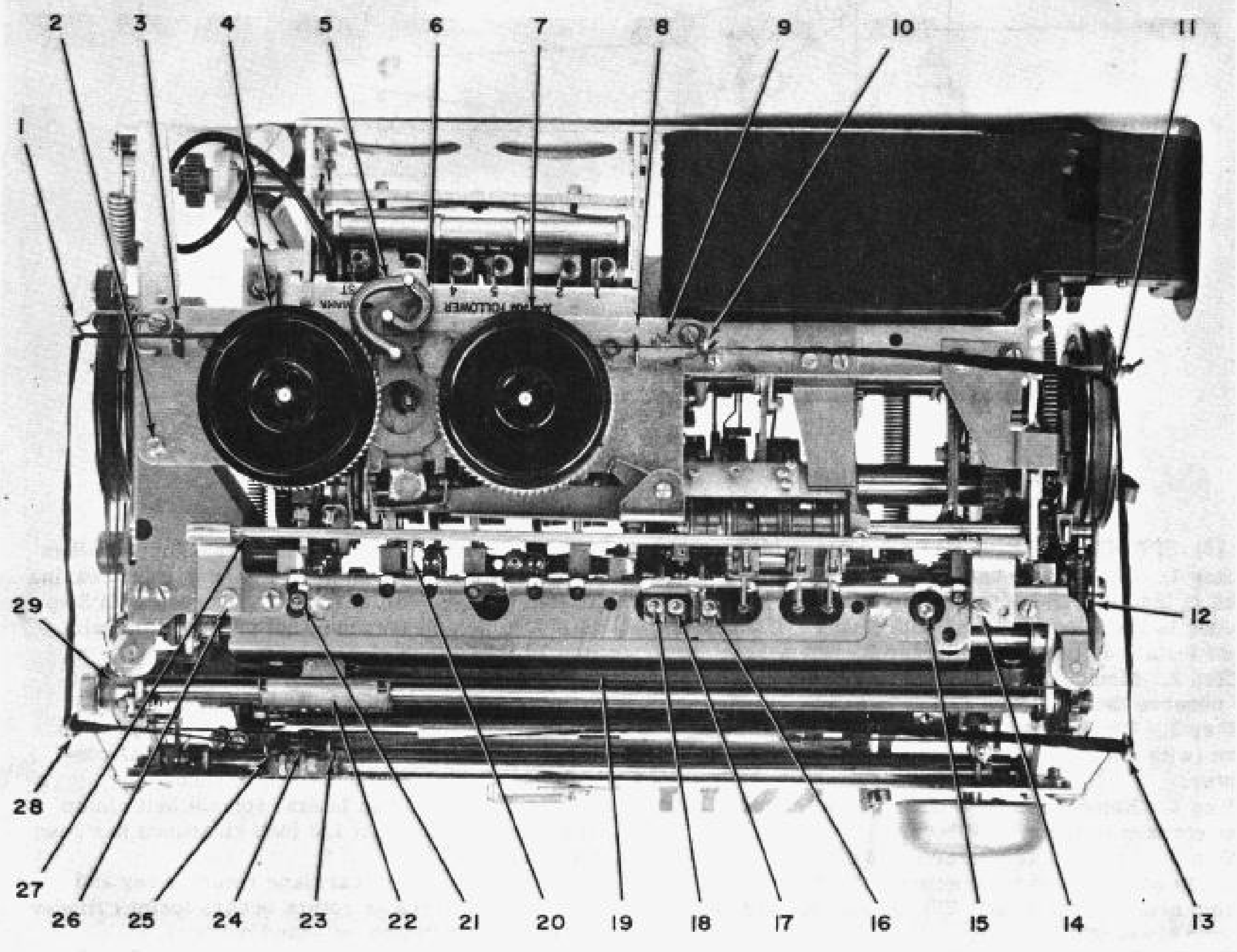
Step 22. Using a 0.050 inch internal hex-wrench thread individual sprocket teeth into threaded holes on either end of paper feed roller.

Step 23. Push in paper release button on front of chassis to release paper feed roller pressure.

f. DISASSEMBLY PROCEDURES. - Perform the following disassembly procedures in the exact sequence indicated. Use extreme care not to damage any parts; do not disturb adjacent parts or adjustments. Carefully place disassembled parts on a clean dry surface in their approximate relative position to facilitate reassembly.

The figure and index references used in the procedures refer to parts location illustrations in this section or appendix.

g. DISASSEMBLY OF PRINTER INTO FOUR MAIN SUBASSEMBLIES (Mainshaft, Paragraph 5-5e(1), Rear Half, Paragraph 5-5e(2), Front Frame, Paragraph 5-5e(3) and Ribbon Feed, Paragraph 5-5e(4).



KEY	ITEM
1	Guide, Left Rear Ribbon
2	Screw
3	Bar, Left Yoke of Reversing
4	Spool, Left Ribbon
5	Spring, Drive Pawl
6	Spring, Check Pawl
7	Spool, Right Ribbon
8	Bar, Right Yoke of Reversing
9	Screw
10	Guide, Right Ribbon
11	Guide, Right Rear Ribbon
12	Cable, Return
13	Guide, Right Front Ribbon
14	Screw
15	Screw, Lifter Arm
16	Clamping Screw, Function Cam Follower
17	Clamping Screw, Print Prevent Arm
18	Clamping Screw, Print Cam Follower
19	Lateral Control Belt (Right portion of two piece belt)
20	Spring Post, Secondary Number 3 Cam Follower
21	Clamping Screw, Print Spring Arm
22	Yoke Print Cylinder
23	Guide, Hammer Ribbon
24	Hammer
25	Guide, Hammer Ribbon
26	Screw
27	Bar, Paper Guide
28	Guide, Left Front Ribbon
29	Spring Retainer, Rotary Motion

Figure 5-82. Print Assembly, Top View

Step 1. Remove two screws (26 and 14, Figure 5-82) and paper guide bar (27) from printer frame.

Step 2. Remove left ribbon spool (4) and disengage ribbon from left rear ribbon guide (1), left front ribbon guide (28), hammer ribbon guides (25 and 23), right front ribbon guide (13), and right rear ribbon guide (11).

Step 3. Remove ribbon from right ribbon guide (10) and lift right ribbon spool (7) off ribbon spool post.

Step 4. Remove two screws (2 and 9) and lift ribbon feed assembly off of printer.

Step 5. Remove two screws (6, Figure 5-83), bounce prevent lever guide (7), and ribbon guide (8).

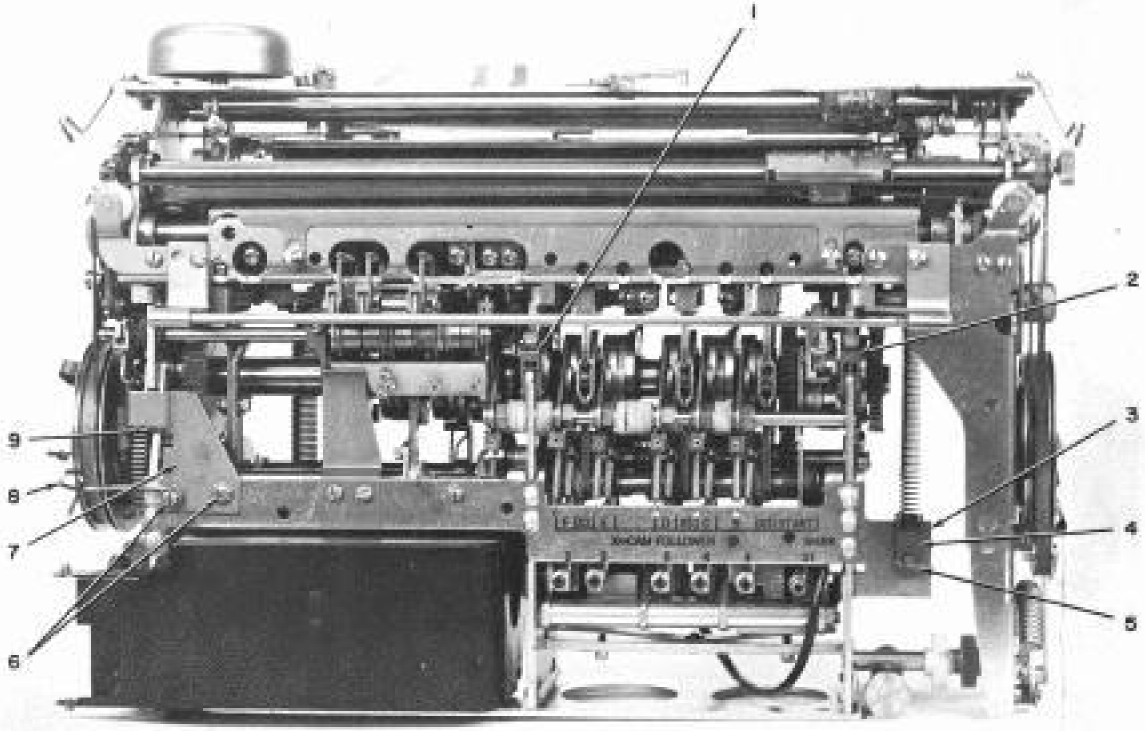
Step 6. Loosen three frame clamps (1, 2, and 9, Figure 5-83) and swing clamps so that clamps are not securing printer frame halves.

Step 7. Position printer on its backplate.

Step 8. Loosen three clamp screws (1, 4, and 9, Figure 5-84) and swing clamps so that they are not securing printer frame halves.

NOTE

It will be necessary to use an offset allen wrench on frame clamp screw (4). If none is available loosen four screws securing manual off-line function slide (5) to printer to permit access to frame clamp screw (4).



KEY	ITEM
1	Clamp
2	Clamp
3	Rear Frame Extension
4	Retaining Plate
5	Retaining Ring
6	Screws
7	Bounce Lever Guide
8	Right Rear Ribbon Guide
9	Clamp

Figure 5-83. Printer Standing on Backplate
(Ribbon Feed Assembly Removed)

Step 9. Remove plate screw and retaining plate (6) from off-line function slide assembly (5) and printer frame assembly.

Step 10. Remove clevis pin (8) from function lever and spring yoke.

Step 11. Remove retaining ring (5, Figure 5-83) and print spring retaining plate (4) from post on rear frame extension.

Step 12. Remove spring from end of secondary number 3 cam follower and post (3, Figure 5-84) on front frame.

NOTE

Timing mark relationship has been established at factory and should be maintained.

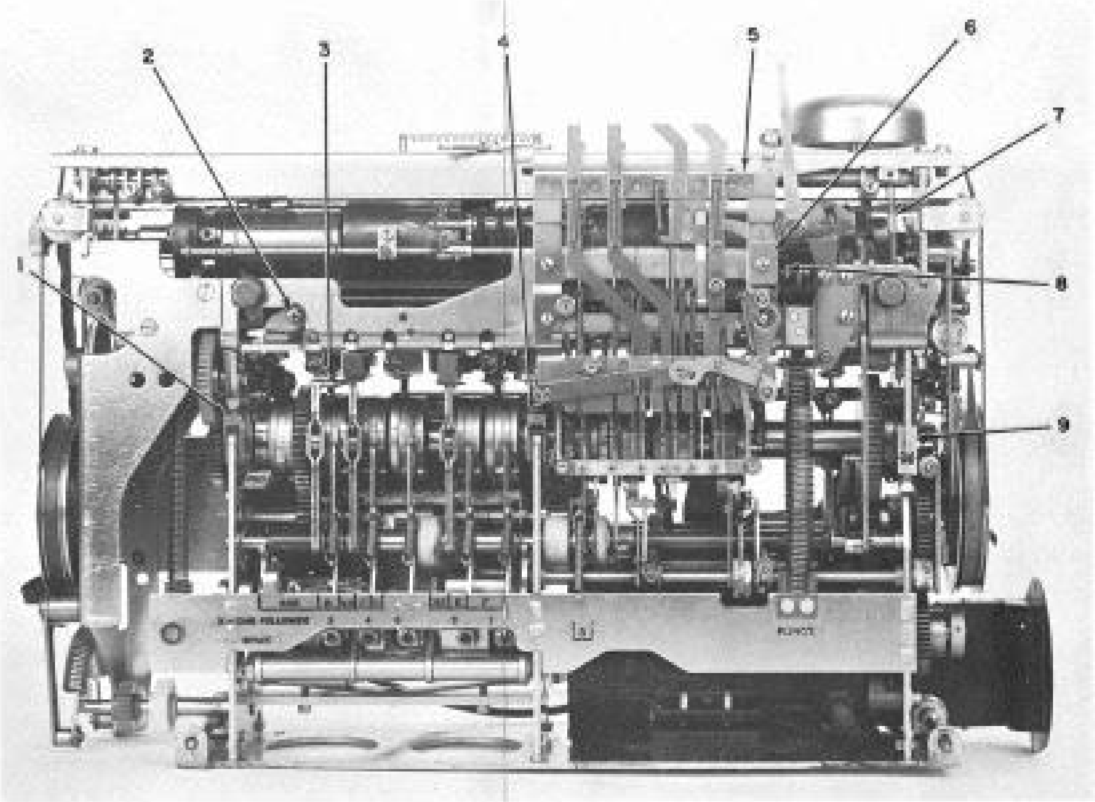
Step 13. Make a small diagram showing existing timing mark relationship, so that same relationship can be established during reassembly (refer to Figure 4-11 for location of timing marks only).

NOTE

Ensure that mainshaft remains in rear half of printer while lifting off front half.

Step 14. Carefully grasp front half of printer and lift it away from rear half.

Step 15. Grasp mainshaft by its ends and lift it out of rear frame.



KEY	ITEM
1	Clamp
2	Adjustment Screw, Lateral Positioning Belt
3	Cam Follower, Secondary Number 3
4	Clamp
5	Slide, Off-Line Function
6	Plate, Retaining
7	Spring, Hammer Backstop
8	Pin, Clevis
9	Clamp

Figure 5-84. Printer Bottom View
(Printer Standing on Backplate)

(1) MAINSHAFT DISASSEMBLY.

Step 1. Separate two halves of main shaft at center bearing.

Step 2. Remove retaining ring (1, Figure 5-85, Appendix) from selector main shaft (24).

Step 3. Slide printer helical gear (2) off selector main shaft (24), being careful not to loose woodruff key (3).

NOTE

If the key (3) does not come off the shaft when gear is removed, push key out.

Step 4. Slide start clutch release assembly (which consists of items 4 through 15) off main shaft.

Step 5. Unhook start clutch backstop lever spring (4) from range adjustment assembly (5) and start clutch backstop lever (12).

Step 6. Remove retaining ring (15); slide start clutch release latch (14) and felt washer (13) off pin on which they are mounted.

Step 7. Slide start clutch backstop lever assembly (which consists of part numbers: 7, 8, 9, 10, 11, 12) off pin on which it is mounted.

Step 8. Loosen clamp screw (8) and slide clamp (7) off start clutch backstop lever (12).

Step 9. Remove start clutch backstop eccentric bushing (9) from start clutch backstop lever (12).

Step 10. Remove lock nut (10) and start clutch release adjustment setscrew (11) from start clutch backstop lever (12) by turning counterclockwise.

Step 11. Slide left-hand bearing (16) out of left-hand bearing retainer (6) by pressing out with fingers.

Step 12. Disassemble remainder of selector main shaft by removing parts in the sequence established in Figure 5-85, Appendix.

CAUTION

USE EXTREME CAUTION REMOVING ITEMS (19) FROM CLUTCHES (20, 22, 23, 28, 27, AND 26) AS EACH ITEM CONSISTS OF 28 ROLLERS WHICH CAN EASILY BE LOST.

Step 13. Remove center bearing retainer (1, Figure 5-86, Appendix) and center bearing (2) from function main shaft (14).

Step 14. Remove center bearing (2) from center bearing retainer (1) by pushing it out with fingers.

Step 15. Remove items (3) through (9) and items (17) (16) and (15) from function main shaft (14) in sequence shown in Figure 5-86, Appendix.

CAUTION

USE EXTREME CARE WHEN REMOVING ITEMS (6) FROM CLUTCHES (7, 9, 17, AND 15) AS EACH ITEM CONSISTS OF 28 ROLLERS WHICH CAN EASILY BE LOST.

Step 16. Remove right-hand bearing (11) and right-hand bearing retainer (10) from function main shaft (14) and disassemble as instructed in step 14.

Step 17. Slide third reduction gear (13) off function main shaft (14); remove third reduction gear woodruff key (12) from shaft.

(2) REAR HALF DISASSEMBLY.

(a) BACK PLATE REMOVAL AND DISASSEMBLY.

Step 1. Loosen and remove two screws, lock washers, and washers (2, 3, and 4, Figure 5-87, Appendix).

Step 2. Loosen six back plate clamp retaining screws (1A, Figure 5-92, Appendix), slide back plate (1) to left and then back to right to disengage back plate from rear frame.

(b) MOTOR, MOUNTING PLATE, AND FAN OUTLET DUCT REMOVAL.

Step 1. Remove lock nut (8, Figure 5-90, Appendix) from speed change gear (7); loosen idler gear lock nut (21) and push idler gear assembly (16) toward bottom of printer; slide speed change gear (7) off shaft of first reduction gear (5).

Step 2. Remove three screws (3), lock washers (2), and washers (1); slide motor mounting plate (13) and motor assembly out of rear frame.

Step 3. Remove three screws (10), three lock washers (11), and motor mounting plate from motor.

Step 4. Remove two screws (1, Figure 5-87, Appendix) from cooling housing (6) and slide motor out of housing.

CAUTION

DO NOT REMOVE DRIVE PINION ON MOTOR.

Step 5. Disassemble 60-cycle motor impeller or electrical connector by following the index sequence established in Figure 5-88, Appendix.

(c) SELECTOR REMOVAL AND DISASSEMBLY. - For removal and disassembly of selector, proceed as follows:

Step 1. Loosen two screws (3, Figure 5-89, Appendix) in lock bar (5).

Step 2. Slide lock bar (5) to left to release the right side of bar, and then slide to right to release left side of bar.

CAUTION

WHEN PERFORMING STEP 3, ENSURE THAT NONE OF ARMATURE MARK AND SPACE PADDLE LATCH PORTIONS OF SELECTOR MARK AND SPACE LATCH SHAFTS (6 AND 11) CATCH ON CLUTCH RELEASE ARMS.

Step 3. Remove selector assembly from rear frame.

Step 4. Remove selector shaft bias springs (7) from selector assembly.

Step 5. Referring to Figure 5-89, Appendix, for orientation, stand selector assembly on end, on a clean work surface, with selector tie rod studs (9) hexheads facing down.

Step 6. Remove screw (16), lock washer (17) and cable strain relief bracket (18) from left-hand (upper) magnet assembly (15).

Step 7. Remove nut (1) and lift left-hand (upper) magnet assembly (15) clear of selector tie rod studs (9), selector mark latch shafts (6), and selector space latch shafts (11); remove outer frame plate spacers (2) from left-hand magnet assembly (15).

Step 8. Remove selector mark latch shafts (6) and selector space latch shafts (11) from their pivot holes in right-hand magnet assembly (10).

Step 9. Remove inner frame plate spacers (8) from selector tie rod studs (9); lift right-hand magnet assembly (10) and remove selector tie rod studs (9), and outer frame plate spacers (2).

(d) GEAR TRAIN AND AUTOMATIC CARRIAGE RETURN AND LINE FEED ASSEMBLY REMOVAL. - Refer to Figure 5-90, Appendix, and proceed as follows:

NOTE

> Lock nut (8) and speed change gear (7) must be removed prior to motor removal.

Step 1. Remove pin (4) from first reduction gear (5).

Step 2. Remove three screws (10) and lock washers (11) from motor mounting plate (13).

Step 3. Remove bearing cup (12) from motor mounting plate (13).

Step 4. Remove first reduction gear (5) from motor mounting plate (13).

Step 5. Press bearings (6) out of motor mounting plate (13) and bearing cup (12).

Step 6. Remove idler gear lock nut (21) and slide idler gear stud (14) out of idler gear arm assembly (15).

Step 7. Remove ring (20) and idler gear (16) from idler gear arm assembly (15).

Step 8. Pull idler gear bearing (17), spacer (19), and ring (18) out of shouldered side of idler gear (16); press remaining idler gear bearing (17) out of idler gear (16).

Step 9. Remove four retaining rings (36) from V lever shaft (35).

Step 10. Loosen lock lever actuator arm screw (38), and automatic carriage return and line feed actuator arm (48) screw (38).

NOTE

> Parts on V lever shaft will fall out of printer when V lever shaft is removed. Items (50), (51) and (52) are used on AN/UGC-38 and permit printing a dash (-) when in upper case blanks.

Step 11. Remove lock lever actuator arm helical spring (43) and automatic carriage return and line feed bail actuator helical spring (44), then slide V lever shaft (35) out of the printer frame.

Step 12. Support third reduction pinion (24), using a suitable fixture or block, and carefully press pin (23) out of third reduction pinion (24).

NOTE

> Idler gear arm assembly (15) is freed when ring (29) is removed.

Step 13. Slide third reduction pinion (24), bearings (25), rings (26 and 29), and spacer (27) off shaft on second reduction gear (28).

(e) MARK AND SPACE CLUTCH RELEASE SELECTOR SHAFT, TIMING CAM SHAFT AND BACKSTOP SHAFT REMOVAL.

Step 1. Remove six inter-arm springs (35, Figure 5-91, Appendix).

Step 2. Remove print and function clutch release arm spring (51).

Step 3. Remove eight retaining rings (11) from mark clutch release selector shaft (10) and ten retaining rings (11) from space clutch release selector shaft (36).

Step 4. Remove line feed pawl spring (26).

Step 5. Remove function timing cam wick (52) and timing cam wick (53) from space clutch release selector shaft (36).

NOTE

> If the mark and space shafts referred to in step 6 have a tapped hole in their left end, insert a 6-32 screw to aid in removing the shafts.

Step 6. Slowly pull mark clutch release selector shaft (10) to the left and pick off each part as it would fall off the shaft; repeat this procedure for space clutch release selector shaft (36).

NOTE

> If space shaft (36) is tight, loosen line feed cam follower arm clamping screw (49).

Step 7. Remove retaining ring (19) and safety spring (18); slide mark clutch release finger (34) off mark clutch release arm assembly (20); remove clutch release finger adjustment screw (13) and lock nut (14) from mark clutch release arm assembly (20).

Step 8. Disassemble remainder of clutch release assemblies in same manner as described in step 7.

Step 9. Loosen line feed cam follower arm clamping screw (49) and slide line feed cam follower arm (44) off line feed torque tube arm assembly (45).

NOTE

> When performing Step 10, do not remove screws (27); this is a factory adjustment.

Step 10. Remove screw (31), washer (32), then remove bell prevent lever (33) from letters figures pulley carriage actuator and cam follower (22).

Step 11. Remove retaining ring (24) and slide line feed pawl (25) off line feed motion amplify link (23).

Step 12. Remove two retaining rings (3 and 8) from backstop shaft (1).

Step 13. Unfasten clutch backstop springs (9) from clutch backstop levers (5).

Step 14. Slowly pull backstop shaft (1) to left and pick off each of the parts as they fall off shaft.

Step 15. Loosen clamp screw (6) and slide clamp (7) off clutch backstop lever (5).

Step 16. Push clutch backstop eccentric bushing (4) out of clutch backstop lever (5).

Step 17. Remove three screws and three lock washers (22 and 23, Figure 5-92, Appendix) from bearing retainer (67, Figure 5-91, Appendix).

Step 18. Remove timing cam shaft assembly (items 56 through 64) by pulling to left.

Step 19. Remove bearing retainer (67) and bearing (66) from timing cam shaft (64).

Step 20. Push bearing (66) out of bearing retainer (67).

Step 21. Remove retaining ring (63) and pull timing cam shaft gear (62) off timing cam shaft (64).

Step 22. Remove key (54) and spacer (61) from timing cam shaft (64).

Step 23. Remove timing cams (59) and keys (54), and spring (60) from timing cam shaft (64).

Step 24. Remove bowed retaining ring (56) and pull function clutch release cam (57) off timing cam shaft (64).

Step 25. Remove key (54) and slide spacer (55) and bearing (58) off timing cam shaft (64).

(f) REAR FRAME DISASSEMBLY

Step 1. Remove function helical spring yoke link assembly (10, Figure 5-92, Appendix) from function helical spring (9) by twisting link, off spring, clockwise.

Step 2. Remove function helical spring (9) from mounting bracket by twisting spring clockwise.

Step 3. Remove print spring retainers (18) from print helical spring (17) by twisting them off.

NOTE

Retaining ring (6) was removed to free print spring from rear frame during separation of front and rear frames. It will be necessary to remove retaining ring securing print spring (17) and spring retainer (18) to print spring arm frame.

Step 4. Remove two screws (4) and advance prevent stop spring (5).

Step 5. Loosen screw (33) and washer (32); remove backstop spring clip (11).

Step 6. Remove screw (31), lock washer (30), positioning clip (7) and change gear post (29) from frame.

CAUTION

WHEN PIN (28) IS REMOVED FROM CHANGE GEAR POST (29), DETENT BALL (27), DETENT HELICAL SPRING (26), AND LOCK ARM (25) ARE FREE.

Step 7. Press pin (28) out of change gear post (29).

Step 8. Remove screw (21), lock washer (20), and start cam lubricating wick assembly (19) from rear frame (8).

Step 9. Remove four retaining rings (16) and frame clamp stud pivots (12) from three frame clamps (13) and one frame clamp (24).

Step 10. Remove four frame clamp screws (15), and four frame clamp pads (14) from three frame clamps (13) and one frame clamp (24).

(3) FRONT FRAME DISASSEMBLY

(a) TAKEUP DRUM AND LINKAGE DISASSEMBLY.

Step 1. Remove two screws (9, Figure 5-98, Appendix) and two screws (49) from front frame assembly.

Step 2. Hold takeup drum (7, Figure 5-93, Appendix) and loosen return and print hammer cables by sliding knots out of their respective slots; loosen lateral control belt by removing screw (1), lock washer (2), and lateral control belt clamp (3) and nut (53) on takeup drum. Release carriage return spring (8) tension by allowing takeup drum to slowly unwind.

Step 3. Remove lateral control belt and print hammer and return cables.

Step 4. Pull takeup drum bracket assembly (23) to left to disengage it from front frame.

Step 5. Remove two retaining rings (20) and two flat washers (21) from takeup arm (14), and takeup drum bracket assembly (23).

Step 6. Slide lateral tension helical spring (22) from takeup arm (14) and takeup drum bracket assembly (23).

CAUTION

ALL PULLEY BEARINGS ARE PRESSED INTO PULLEYS AT FACTORY AND SHOULD NOT BE PRESSED OUT.

Step 7. Remove ring (12), flat washer (13), and takeup arm (14) from takeup drum bracket assembly (23).

Step 8. Remove grip ring (19) and spacer (18); slide belt pulley assembly (15) off takeup arm (14).

Step 9. Press groove pin (26) out of range finder knob (52) and remove conical range finder slide lock (27) and range finder lock helical spring (28); remove range finder knob (52) from range dial (51), then remove range dial (51) from takeup drum bracket assembly (23).

Step 10. Remove two screws (48) to remove left-hand belt pulley bracket (44) from takeup drum bracket assembly (23).

Step 11. Remove two hex-nuts (56 and 57), washer (54), compression spring (55), washer (54), pulley (46), and friction washer (45) from bracket assembly (44).

Step 12. Remove grip ring (19) and pulley (47) from stud on takeup drum bracket assembly (23).

Step 13. Remove nut (25) and lock washer (24); grasp takeup drum (7) and pull to left.

NOTE

When performing Step 14, ensure that carriage return spring holder (11) remains close to takeup drum (7) to prevent carriage return spring (8) from jumping out.

Step 14. Slide carriage return spring mounting cup (10) off takeup drum shaft (9).

Step 15. Remove retaining ring (4), and washer (5); and pull takeup drum (7) off takeup drum shaft (9).

Step 16. Carefully remove carriage return spring holder (11) and carriage return spring (8) from takeup drum (7).

Step 17. Pull nylon bearings (6) out of takeup drum (7).

Step 18. Remove two screws (50) and two flat washers (49) to remove range finder lock lever assembly (30).

NOTE

In next step, range finder lock lever (30) and range finder lock lever spring (31) will fall free as range finder lock lever shaft (29) is removed.

Step 19. Remove retaining ring (33) and pull range finder lock lever shaft (29) from range finder lock lever bracket (32).

(b) FRONT PLATE REMOVAL AND DISASSEMBLY.

Step 1. Remove ribbon from left and right ribbon guides (15 and 8, Figure 5-94, Appendix) if still in place.

Step 2. Remove two screws (52, Figure 5-98, Appendix) and front plate assembly (4, Figure 5-94, Appendix) from front frame assembly.

Step 3. Remove screw (10), washer (9), and left-hand ribbon guide (15) from front plate assembly (4).

Step 4. Remove screw (10), washer (9), and right-hand ribbon guide (8) from front plate assembly (4).

Step 5. Remove screw (13), lockwasher (12) and bell (11) from post on front plate assembly (4).

Step 6. Remove spring (14) from posts on front plate assembly (4) and printer support assembly located on front plate assembly (4).

Step 7. Remove setscrews (7), nuts (6), and lockwashers (5) from front plate assembly (4).

(c) PRINT CYLINDER YOKE SHAFT REMOVAL AND DISASSEMBLY.

Step 1. Remove retaining ring (8, Figure 5-95, Appendix) from print cylinder yoke shaft (7).

Step 2. Slide print cylinder yoke shaft (7) out of front frame assembly and print cylinder yoke (9).

Step 3. Remove right and left loops of lateral control belt from anchor pins in print cylinder yoke (9).

Step 4. Remove print cylinder yoke (9) from print cylinder (17) and print cylinder shaft (23).

(d) PRINT CYLINDER SHAFT REMOVAL AND DISASSEMBLY.

NOTE

If print cylinder shaft is to be removed temporarily, allow rotary cable to remain attached to index wheel and allow index wheel end of print cylinder shaft to hang on side of printer.

CAUTION

WHEN PERFORMING STEP 1, ROTARY MOTION SPRING RETAINER (26, FIGURE 5-95, APPENDIX) SHOULD BE ALLOWED TO UNWIND GRADUALLY OR ROTARY SPRING (28) WILL BE DAMAGED.

Step 1. Remove screw (14, Figure 5-95, Appendix) and lockwasher (15) from right hand bearing retainer (16), freeing the retainer.

Step 2. Remove rotary cable from index wheel (11) by untying knot in cable.

Step 3. Remove two screws (1), lockwashers (2), and washers (3) while holding rotary motion spring retainer (26); allow retainer to rotate slowly to permit unwinding of rotary motion spring (28).

Step 4. Remove upper clamp (4) and lower clamp (5) from around rotary spring retainer (26).

Step 5. Lift print cylinder shaft assembly (23) from front frame assembly.

Step 6. Press pin (10) out of index wheel (11).

Step 7. Remove index wheel (11), spacer (12), and bearing (13) from print cylinder shaft (23).

Step 8. Slide print cylinder (17) off print cylinder shaft (23).

Step 9. Remove grip ring (31), rotary motion spring retainer washer (30), nylon washer (29) and rotary spring retainer (26) containing rotary motion spring (28) and rotary spring housing nylon washer (27) from print cylinder shaft (23) by sliding them to left.

(e) PRINT HAMMER SHAFT REMOVAL AND DISASSEMBLY.

Step 1. Unfasten print hammer actuator link spring (32, Figure 5-95, Appendix) from print hammer actuator link (34).

Step 2. Remove print hammer return spring (50) from right hammer bracket tab (45).

Step 3. Slide entire hammer shaft assembly (37) forward and out of front frame assembly.

Step 4. Remove hammer shaft bearings (35) from each end of hammer shaft assembly (37).

Step 5. Remove retaining ring (33) and hammer actuator link (34) from hammer shaft assembly (37).

Step 6. Remove screw (46) from anti-turn nut (18) and slide right-hand hammer bracket (45) to right and off hammer shaft (37) and bracket and shaft (24) assemblies.

Step 7. Slide hammer assembly (44) to right, off of hammer shaft (37) and bracket and shaft (24) assemblies.

Step 8. Compress ribbon guide (21) and remove it from hammer assembly (44).

Step 9. Remove screw (19), hammer face (20), and nut (22) from hammer assembly (44).

Step 10. Slide four felt washers (43) off of hammer shaft assembly (37).

Step 11. Remove screw (38) from nut (42) and washer (41) and slide hammer stop (40) off hammer shaft assembly (37).

Step 12. Remove screw (36) from anti-turn nut (25) and slide bracket and shaft assembly (24) off of hammer shaft assembly (37).

(f) PAPER FEED ASSEMBLY REMOVAL AND DISASSEMBLY.

Step 1. Loosen screw (23, Figure 5-96, Appendix) and pull paper feed knob (25) off paper feed rubber roll (1).

Step 2. Remove two screws (7, Figure 5-98, Appendix) and two paper guide retaining pins (11) and lift paper feed mechanism out of front frame.

CAUTION

IN STEP 3, EXERCISE CARE NOT TO DAMAGE CABLES AND BELTS WHEN REMOVING PAPER FEED GUIDE (3).

Step 3. Remove grip ring (24, Figure 5-96, Appendix), washer (9), and bearing (8) from end of paper feed rubber roll (1) and out of paper feed guide (3).

Step 4. Press ratchet roll pin (10) out of paper feed ratchet and detent (11) and paper feed rubber roll (1).

Step 5. Remove paper feed ratchet and detent (11), washer (9), and bearing (8) from end of paper feed rubber roll (1) and paper feed guide (3).

Step 6. Remove retaining ring (5), detent assembly (6), and detent spring (4).

Step 7. Remove two retaining rings (7), hinge pins (18), pressure pad springs (21), and pressure pad (22) from paper feed guide (3).

Step 8. Remove paper feed rubber roll (1) from paper feed guide (3).

Step 9. Remove sprocket feed teeth (2) from paper feed rubber roll (1).

Step 10. Loosen two set screws (13) in left and right-hand pressure roll arms (14 and 17).

Step 11. Remove release shaft (20) from holes in paper feed guide (3).

NOTE

Four pressure rollers (15) and both left and right hand pressure roll arms (14 and 17) will be freed when release shaft (20) is removed.

Step 12. Disengage both left and right-hand pressure roll springs (12 and 19) from pressure roll arms (14 and 17) and paper feed guide (3).

(g) PRINT LEVER SHAFT REMOVAL AND DISASSEMBLY.

Step 1. Loosen print prevent arm clamping screw (42, Figure 5-93, Appendix), print cam follower clamping screw (43), and print spring arm clamping screw (42).

NOTE

In the next step, print prevent arm (34) print cam follower (35), and print spring arm (36) will fall free as print lever shaft assembly (39) is removed.

Step 2. Remove two retaining rings (40) and print lever shaft assembly (39) by pulling to the left. Bearing (38) will have to be drilled or reamed out of print lever shaft assembly (39) if removal is necessary.

Step 3. Slide two felt washers (41) off of print lever shaft (39).

(h) ADVANCE DRUM AND LINKAGE DISASSEMBLY.

Step 1. Remove bounce prevent lever spring (24, Figure 5-97, Appendix).

Step 2. Loosen and remove three cable clamp screws (12), lock washers (11), cable clamps (10), and then remove ratchet screw (12), lock washer (11A) and spacer (10A).

Step 3. Remove return cable (90), print hammer cable (92), and lateral control belt (91) from advance drum (9).

Step 4. Remove retaining ring (15), washers (13 and 14), and pull advance drum (9) off advance drum bracket (5).

NOTE

When advance drum (9) is removed ratchet (8) is freed from advance drum bracket (5) shaft.

Step 5. Pull shoulder bearings (6 and 6) out of advance drum (9), freeing spacer (7).

Step 6. Remove grip ring (4), and rotary cable pulley (3), from rotary pulley shim (2).

Step 7. Remove screws (89) freeing check pawl guide bracket (87), and character advance guide (88) from front frame assembly.

Step 8. Pull advance drum bracket (5) and rotary pulley shim (2) from front frame.

Step 9. Press out dowel pins (1) from rotary pulley shim (2).

Step 10. Remove retaining ring (28), check pawl link (29), and spacer (27) from carriage return shaft assembly (25).

Step 11. Remove advance prevent lever spring (26) and character advance pawl spring (35) from carriage return shaft assembly (25).

Step 12. Remove retaining ring (40), ring (39), advance prevent lever (38), and shim (37) from character advance lever shaft assembly (52).

Step 13. Remove screw (30), character advance pawl bushing (31), and character advance pawl (32) from character advance lever shaft assembly (52).

Step 14. Remove retaining rings (41) and slide index link (42) off character advance lever shaft assembly (52) and rotary detent pawl actuator arm (45).

Step 15. Unhook check pawl spring (57) from check pawl (59) and advance suppression latch (71).

Step 16. Remove screw (66), check pawl eccentric bushing (67), check pawl assembly (59), and spacer (68) from front frame assembly.

Step 17. Remove nut (65), lock washer (64), and check pawl eccentric stud (58) from check pawl (59).

Step 18. Remove two screws (63), lock washers (62), washers (61), and check pawl tip (60) from check pawl assembly (64).

Step 19. Unhook and remove rotary detent pawl spring (51) from rotary detent pawl (49) and character advance lever shaft assembly (52).

Step 20. Remove screw (43), rotary detent pawl eccentric bushing (44), rotary detent pawl actuator arm (45), felt washer (46), rotary detent pawl assembly (49), and washer (50) from front frame assembly.

Step 21. Loosen nut (48) and remove rotary detent pawl adjustment screw (47) from rotary detent pawl (49).

Step 22. Remove felt strip clip (34) and felt strip (33) from character advance lever shaft assembly (52).

Step 23. Remove screw (69), advance suppression latch eccentric bushing (70), advance suppression latch (71) and felt washers (72) from advance suppression latch mounting stud (73).

Step 24. Loosen and remove advance suppression latch mounting stud (73) and screw (31, Figure 5-98, Appendix), freeing rotary cable pulley assembly (77, Figure 5-97, Appendix), lateral control belt pulley assembly (80), and spacer bracket (78).

Step 25. Remove grip ring (75), and rotary cable pulley (76), from rotary cable pulley shaft assembly (77).

Step 26. Remove grip ring (75), and internal control belt pulley assembly (79), from lateral control belt pulley bracket (80).

Step 27. Loosen lifter arm clamping screw (54), and function cam follower clamping screw (86).

Step 28. Remove screws (14, Figure 5-98, Appendix), lock washers (13), and print lever and character advance lever shaft support bracket assembly (47) from front frame assembly.

NOTE

> Function cam follower assembly (85, Figure 5-97, Appendix), function lever assembly (56), lifter arm spring (55), lifter arm assembly (53), and felt strip (36) will be freed when character advance lever shaft assembly (52) is removed in Step 29.

Step 29. Slide character advance lever shaft assembly (52) to the right and out of front frame assembly.

Step 30. Remove function cam follower clamping screw (86) from function cam follower (85) and lifter arm clamping screw (54) from lifter arm (53).

Step 31. Remove two special screws (82), function bar (83), and compression springs (84) from function lever (56).

Step 32. Remove retaining rings (18) from carriage return shaft assembly (25).

NOTE

> Carriage return cam follower (17), felt washer (19), and bounce prevent lever assembly (23) will fall free when carriage return shaft assembly (25) is removed in Step 33.

Step 33. Loosen carriage return cam follower clamping screw (16) and slide carriage return shaft assembly (25) out of front frame to the right.

Step 34. Remove carriage return cam follower clamping screw (16) from carriage return cam follower (17).

Step 35. Remove setscrew (22) and slide clamp (21) off bounce prevent lever (23).

Step 36. Push bounce prevent lever eccentric bushing (20) out of bounce prevent lever (23).

i. FRONT FRAME MIDSECTION DISASSEMBLY.

Step 1. Remove four screws (46, Figure 5-98, Appendix), and off line function slide assembly (87, Figure 5-99, Appendix); slide out function sensing finger lever stop strip (89) from front frame assembly.

Step 2. Remove function backstop springs (25).

Step 3. Remove two screws (12, Figure 5-98, Appendix).

Step 4. Remove screw (15), and return cable pulley bracket assembly (16) from front frame assembly.

Step 5. Remove retaining ring (1), and return cable pulley (2) from return cable pulley bracket (16).

Step 6. Remove three screws (37) and lock washers (38).

Step 7. Lift line feed spacing arm assembly (35) out of front frame assembly.

Step 8. Remove shift lever adjustment screw (32) from shift bracket (33).

Step 9. Remove ring (40) and washer (39); pull out line feed shift arm (35) from shift bracket (33).

Step 10. Remove retaining ring (36) and line feed shift (34) from line feed shift arm (35).

Step 11. Remove retaining rings (1), sleeve spacers (41), and lateral control belt pulley assemblies (42) from front frame assembly.

Step 12. Remove retaining rings (1), and pulleys (2) from left and right-hand corners of front frame assembly.

Step 13. Remove two retaining rings (26) and frame clamp pivots (30); slide off frame clamp assembly (27).

Step 14. Remove frame clamp screws (28) and frame clamp pads (29) from frame clamps (27).

Step 15. Remove two lock nuts (10) and pull printer electrical chassis locators (48) out of front frame assembly.

Step 16. Remove retaining ring (1), and pulley assembly (2) from pin (17).

Step 17. Remove nut (45) and pull pin (17) out of front frame.

Step 18. Remove retaining rings (18) and pull straight pin (24) out of front frame assembly. Removal of straight pin (24) frees letters figures carriage pulley assembly.

Step 19. Remove retaining ring (23), sleeve spacer (22), and spring clip (21) from rod (19).

Step 20. Pull letters figures pulley carriage (20) off letters figures pulley carriage rod (19) to free letter figures pulley (2A).

Step 21. Remove screw (7) and print hammer release stop lever (8) from front frame assembly.

Step 22. Remove self-locking nut (50), washers (51 and 53), print hammer release (6), and print hammer release shaft (5) from front frame assembly.

Step 23. Remove screw (4) and print hammer actuator link guide bracket (3) from front frame assembly.

Step 24. Remove retaining ring (66) and belt pulley (43) from lateral pulley post (65).

Step 25. Remove lateral pulley post (65), washer (64), and lockwasher (63) from front frame assembly.

Step 26. Remove retaining rings (61) from pin (60).

Step 27. Slide pin (60) out of lateral belt yoke (59), freeing lateral positioning belt (62).

Step 28. Remove two screws (54), washers (55) and lateral belt adjustment bracket (56) from front frame assembly.

Step 29. Remove screw (57) and nut (58) from lateral belt adjustment bracket (56).

(j) FUNCTION SELECTOR DISASSEMBLY.

Step 1. Remove seven function clutch release arm return helical springs (22, Figure 5-99, Appendix), and remove bell actuator connecting rod (24) from bell advance suppression arm (17).

NOTE

While performing Step 2, ensure that none of the function sensing finger levers are lost as the function selector is removed from the front frame assembly.

Step 2. Remove three screws (47) and pull function selector assembly away from front frame assembly.

Step 3. Remove print prevent rod actuator arm bias spring (38) from function clutch release and backstop frame assembly (35) and right-hand print prevent rod actuator arm (40).

Step 4. Remove screws (44), flat washers (43), and print prevent rod assembly (42).

Step 5. Remove print prevent adjustment screws (46) and print prevent rod lock strip (45) from print prevent rod (42).

Step 6. Remove print prevent rod actuator arm screws (41) and slide right and left-hand print prevent rod actuator arms (40 and 49) off print prevent rod lever shaft assembly (48).

Step 7. Remove retaining ring (39) and slide print prevent rod lever shaft assembly (48) to the left and out of function clutch release arm stop shaft (36).

Step 8. Remove all function sensing finger lever helical springs (12) and off line letters sensing finger lever spring (23).

Step 9. Remove clamp setscrew (1) and clamp (2) from advance prevent bail carriage return bar assembly (28).

Step 10. Slide advance prevent bail carriage return bar shaft (29) out of function clutch release shaft (33) to free advance prevent bail carriage return bar assembly (28).

Step 11. Remove function advance prevent adjustment screw (26) and nylon locking plate (27) from advance prevent bail carriage return bar (28).

Step 12. Remove retaining rings (34) and slide blank advance suppression arm (30), spacer (9), space arm (32), and spacer (9) off function clutch release shaft (33).

Step 13. Slide function clutch release shaft (33) to the left and out of function clutch release and back-stop frame assembly (35) to free spacers (9), line feed and figures clutch release arms (11 and 15), bell advance suppression arm (17), letters clutch release arm (18), and carriage return clutch release arm (21).

Step 14. Remove retaining ring (8) and slide blank sensing finger lever (31) off blank advance suppression arm (30).

Step 15. Remove retaining ring (8) and slide function sensing finger lever (14) off space arm (32).

Step 16. Remove retaining ring (8) and slide line feed sensing finger lever (10) off line feed clutch release arm (11).

Step 17. Remove retaining ring (8) and slide line feed sensing finger lever (13) off-line feed clutch release arm (11).

Step 18. Remove retaining ring (8) and slide function sensing finger lever (14) off figures clutch release arm (15).

Step 19. Remove retaining ring (8) and slide bell actuator sensing finger lever (16) off bell advance suppression arm (17).

Step 20. Remove retaining ring (8) and slide function sensing finger lever (14) off letters clutch release arm (18).

Step 21. Remove retaining ring (8) and slide off line letters sensing finger lever (19) off letters clutch release arm (18).

Step 22. Remove retaining ring (8) and slide off-line carriage return sensing finger lever (20) off carriage return clutch release arm (21).

Step 23. Remove retaining ring (8) and slide carriage return sensing finger lever (10) off carriage return clutch release arm (21).

Step 24. Remove retaining ring (6) and slide function backstop shaft (7) out of function clutch release and backstop frame assembly (35); removal of function backstop shaft (7) will free sleeve spacers and three function backstops.

Step 25. Remove clamp setscrews (1) and slide clamps (2) off function backstops (3). Press out function backstop eccentric bushings (4) from function backstops (3).

Step 26. Remove retaining ring (37) and slide function clutch release arm stop shaft (36) out of function clutch release and backstop frame assembly (35).

Step 27. Loosen nut (84) and remove print prevent stop adjustment setscrew (85) from off-line function slide assembly (87).

Step 28. Remove retaining ring (81) and bell lever assembly (88) from off-line function slide assembly (87).

Step 29. Remove off-line function return helical springs (86) from off-line function slide assembly (87).

Step 30. Remove cancellation spring (4, Figure 5-100, Appendix) from tab on cancellation lever (2), and carriage return lever (9).

NOTE

Latch (7) and latch spring (8) will be freed by performing Step 31.

Step 31. Remove retaining rings (10, 11, and 12); disengage latch spring (8) from carriage return lever (9).

Step 32. Remove retaining ring (14) and line feed lever (13) from off-line function plate (1) assembly.

Step 33. Remove retaining ring (3) and cancellation lever (2) from off-line function slide assembly (1).

Step 34. Remove screw (15) and eccentric (17) from off-line function slide assembly (1).

Step 35. Remove nut (16), lockwasher (6), washer (5) and slide (18) from off-line function slide assembly (1).

Step 36. Remove retaining ring (55, Figure 5-99, Appendix) from lateral control function slide (68) and pull lateral control belt assembly (76) to front of machine.

Step 37. Remove retaining ring (72), pin (73), and lateral control belt pulley assembly (69) from fork (74).

Step 38. Remove fork (74) and slack takeup spring (75) from slack takeup slide (76) by turning fork counterclockwise.

Step 39. Remove safety spring (53) from rotary strip (54).

Step 40. Remove retaining ring (55) and pull rotary cable strip assembly (54) off rotary function slide (66).

Step 41. Remove retaining ring (52), pin (51), and rotary positioning belt (50) from rotary strip (54).

Step 42. Remove retaining ring (56), pin (58), and rotary cable pulley (57) from rotary strip (54).

Step 43. Remove three screws (61) and spacers (60) from support (67), and remove the function slide assembly from front frame assembly.

Step 44. Remove screws (65), lock washers (64), clips (63), and spacers (62) from support (67). Lateral control function slide (68) and rotary function slide (66) are now free.

(k) FRONT FRAME REAR SIDE ASSEMBLY.

Step 1. Remove secondary number 3 cam follower spring (26, Figure 1-101, Appendix).

Step 2. Remove nut (47) from rotary positioning belt adjustment screw.

Step 3. Remove retaining rings (24) from pin (25).

Step 4. Slide pin (25) out of rotary positioning belt yoke (23).

NOTE

Rotary positioning belt is now free to be removed from front frame assembly. The other end of the belt was freed during function selector disassembly. Rotary positioning belt adjustment screw (27) is also freed by removal of pin (25).

Step 5. Remove screw (16), bushing (17), printer keyboard idler gear assembly (18), spacer (19), idler gear plate (20), lock washer (21) and nut (22) from front frame assembly (46).

Step 6. Remove letters-figures cam follower stroke adjustment screw (38) from front frame assembly (46).

Step 7. Remove retaining ring (40), straight pin (44) and line feed shift lever (39) from front frame assembly (46).

Step 8. Remove retaining ring (43) and rotary cable adjustment screw (45) from front frame assembly (46), freeing rotary cable adjustment bracket (42) and nylon lock block (41).

Step 9. Remove number 5 lateral stroke adjustment screw (32), nut (30), and lock washer (31) from front frame assembly (46).

Step 10. Remove remaining four stroke adjustment screws (32), lock washers (31), and nuts (30) from front frame assembly (46).

Step 11. Remove retaining ring (33); pull shaft (37) out of front frame assembly (46), freeing spacer (36), pulley (35) and spacer (34).

NOTE

Removal of number 1 through number 5 carriage pins (1) allows carriage pulley assemblies (6 and 7) to fall free.

Step 12. Remove retaining rings (2) from all carriage pins (1) and remove carriage pins (1) by sliding them out of rods (5 and 5A) and front frame assembly (46). (There are five carriage pins (1).)

Step 13. Remove retaining ring (10), sleeve spacer (9) and carriage clip (8) from carriage pulley rod (5A).

Step 14. Pull carriage (7) off carriage pulley rod (5A) freeing carriage pulley (11).

Step 15. Repeat steps 13 and 14 for the other rotary pulley carriage assembly.

Step 16. Remove retaining ring (10), sleeve spacer (9), carriage clip (8) from carriage pulley rod (5).

Step 17. Slide carriage (6) off carriage pulley rod (5).

Step 18. Remove retaining ring (3), washers (4) and pulley (11) from carriage pulley rod (5).

Step 19. Repeat steps 13 through 15 to disassemble remaining two lateral pulley carriage assemblies (6).

(4) RIBBON FEED DISASSEMBLY

Step 1. Remove two cotter pins (20, Figure 5-102, Appendix), two washers (19), left (1) and right (2) hand spool spindles, and two spring washers (15) from plate assembly (28).

NOTE

Spool clips (30) should not be removed from left and right hand ribbon spool spindles (1 and 2) unless replacement is necessary.

Step 2. Remove drive pawl spring (6) from post on drive pawl assembly (4) and post on plate assembly (28).

Step 3. Remove check pawl spring (7) from post on check pawl assembly (8) and post on plate assembly (28).

Step 4. Remove retaining rings (5 and 3), drive pawl assembly (4), and check pawl assembly (8) from plate assembly (28).

Step 5. Remove retaining ring (13) and slide power lever (14) with its power lever spring (12) from post on plate assembly (28).

Step 6. Remove two screws (16), washers (17) and left and right hand ribbon guides (29 and 18) from plate assembly (28).

Step 7. Remove screw (21), washer (22), bracket (23) from plate assembly (28).

Step 8. Slide gear shaft assembly (26) out of bushing in plate assembly (28).

Step 9. Slide ribbon drive gear (27) and cam (24) off end of shaft (26).

Step 10. Press two pins (25) out of shaft (26).

Step 11. Remove two retaining rings (3), reverse bar (9), washer (10) and two washers (11) from posts on plate assembly (28).

h. KEYBOARD DISASSEMBLY.

Step 1. Remove screws (2 and 3, Figure 5-103, Sheet 1, Appendix) and lock washers (4); remove keyboard left-hand rail (1).

Step 2. Remove screws (6) and lock washers (7); remove keyboard right-hand rail (5).

Step 3. Remove screws (22, and 23) and space bar safety guard cover (20); remove four screws (13), BREAK push button switch nut (11) and remove key board cover (16).

Step 4. Remove nuts (40), lock washers (41), and space bar control arm (38); slide space bar shaft (39) out of front support (236, Figure 5-103, Sheet 2, Appendix).

Step 5. Remove screws (32, Figure 5-103, Sheet 1, Appendix), lock washers (33), and key retaining strip (31).

Step 6. Remove space bar (42) by pulling forward.

Step 7. Remove all keys by pulling them forward.

NOTE

A key assembly consists of a lever and keytop; but these will not be disassembled unless replacement is necessary.

Step 8. Remove wear pad (83).

Step 9. Remove screws (44) and front key guide (43) from front support (236, Figure 5-103, Sheet 2, Appendix).

Step 10. Remove screws (195, Figure 5-103, Sheet 1, Appendix) and lock washers (196); remove switch bracket (194), complete with switches and filter.

Step 11. Remove two screws (86), and slip connector contact (85); then remove two screws (88), two lock washers (89), two flat washers (91), terminal lug (90) and code pulsing (readout) contact (87), from left frame assembly (271, Figure 5-103, Sheet 2, Appendix).

Step 12. Remove screws (92, Figure 5-103, Sheet 1, Appendix) and lock washers (93) and master pulsing contact assembly (84) from left frame assembly (271, Figure 5-103, Sheet 2, Appendix).

Step 13. Remove backstop spring (94, Figure 5-103, Sheet 1, Appendix).

Step 14. Remove screws (272, Figure 5-103, Sheet 2, Appendix) and lock washers (273).

Step 15. Remove left top frame (270).

Step 16. Remove screws (257), lock washer (258) and top left code bar guide (256).

Step 17. Lift keyboard cam shaft assembly (96, Figure 5-103, Sheet 1, Appendix) out of left bottom frame.

Step 18. Remove bearing (108, Figure 5-103, Sheet 3, Appendix) sleeve spacer (109), keyboard drive gear (110); and clutching rollers (107).

Step 19. Loosen clutch assembly setscrew (104); slide clutch assembly (106) off keyboard drive shaft assembly (111).

Step 20. Slide pulsing cam assembly (105) off star stop cam bushing (103).

Step 21. Remove bearing (97) and sleeve spacer (98); pull keyboard drive shaft assembly (111) out of start stop cam bushing (103).

Step 22. Remove bearings (99) from start stop cam bushing (103).

Step 23. Remove screws (101) master pulsing cam (100), and start pulse eccentric (102) from start stop cam bushing (103).

Step 24. Remove cam follower clutch release eccentric (170, Figure 5-103, Sheet 1, Appendix) by removing nut (171), flat washer (172), and felt washer (173).

Step 25. Remove clutch release helical spring (167) and cam follower clutch release (169).

Step 26. Remove repeat key actuator arm screw (181) and repeat key actuator arm nutplate (182); remove repeat key actuator arm (180).

Step 27. Remove lever (183), clutch release finger (184) and spring (185) from repeat key shaft (201).

Step 28. Remove screws (18) and lock washers (19); remove right side cover (17).

Step 29. Remove screw (199), clamp nutplate (200) and screw (28); slide repeat key lever clamp (198) off repeat key shaft (201).

Step 30. Remove repeat key lever helical spring (24) and pull repeat key lever (27) out of right frame.

Step 31. Remove screw (26) and repeat keystop (25) from right frame.

Step 32. Remove grip rings (202) and retaining rings (203); pull repeat key shaft (201) out of left bottom frame (271, Figure 5-103, Sheet 1, Appendix) and right frame (250).

NOTE

Repeat key shaft bushing (204) should be removed from the left bottom frame after repeat shaft (201) has been removed.

Step 33. Remove screw holding keyboard interlock (205) (solenoid and bracket assembly) to keyboard frame.

Step 34. Press out pins (206, Figure 5-103, Sheet 4, Appendix).

Step 35. Remove spring (209) and washer (208) from link (210).

Step 36. Remove link (210) from release pin (207).

NOTE

Further disassembly of solenoid assembly (211), removing two locknuts (215) and nuts (214), is not necessary unless replacement of the nuts, solenoid plunger (212), or plunger rod (213) is required.

Step 37. Remove two screws (216) freeing two lockwashers (217) three washers (218) mounting bracket (220), leaf spring (219) from solenoid (211).

Step 38. Loosen bail support shaft setscrew (260, Figure 5-103, Sheet 2, Appendix) remove rings (166 and 175, Figure 5-103, Sheet 1, Appendix) and slide bail support shaft (177) out of left bottom frame.

NOTE

Release lever assembly (165) will be freed by removal of ball support shaft (177).

Step 39. Remove retaining rings (163), securing lever link (162) to lever assembly (165) and finger lever (183).

Step 40. Remove straight pin (249, Figure 5-103, Sheet 2, Appendix) from right frame (250) by removing retaining ring and felt washer (located to left of right frame wall).

NOTE

Bail support assembly (168, Figure 5-103, Sheet 1, Appendix) will be freed with removal of straight pin (249, Figure 5-103, Sheet 2, Appendix).

Step 41. Remove screws (238, Figure 5-103, Sheet 2, Appendix), lock washers (239), and rear support (245) from frames (271) and (250).

Step 42. Remove screws (242), lock washers (243), key lever leaf spring mounting strip (244), and key lever leaf spring (241) from rear support (245).

Step 43. Remove screws (238) lock washers (239) and front support (236) from frames (271) and (250).

Step 44. Remove screw (150, Figure 5-103, Sheet 5, Appendix) lock washer (151), and keyboard contact actuator (149) from master pulsing cam follower (152).

Step 45. Remove helical springs (112 and 113, Figure 5-103, Sheet 1, Appendix).

Step 46. Remove screw (118), lock washer (119) shaft clamps (115 and 116), and pulsing finger adjustment shims (117) from left bottom frame.

Step 47. Lift pulsing finger and prevent lever assembly (114) from left bottom frame.

Step 48. Disassemble pulsing finger and prevent lever assembly by removing retaining ring (154, Figure 5-103, Sheet 5, Appendix) and sliding all the parts off pulsing finger and prevent lever shaft (155).

Step 49. Remove screws (226, Figure 5-103, Sheet 1, Appendix) and lock washers (227); lift code bar guide (231) and number 1 through 5 code bars out of frames.

Step 50. Remove numbers 1 through 5 code bars (157 through 161) from code bar guide assembly (231).

Step 51. Remove screws (229), lock washers (230) and key guide (228) from code bar guide assembly (231).

Step 52. Remove pin (10) freeing spacer (9) and four rollers (8) from code bar guide assembly (231).

Step 53. Repeat Step 47 to remove remaining three sets of rollers and pins from code bar guide assembly (231).

Step 54. Loosen backstop eccentric shaft setscrew (260, Figure 5-103, Sheet 2, Appendix) and remove retaining ring (262) from backstop eccentric shaft (261).

Step 55. Slide backstop eccentric shaft (261) from clutch backstop assembly (263).

Step 56. Remove screws (233, Figure 5-103, Sheet 1, Appendix), lock washers (323) and top right code bar guide (234) from right frame.

NOTE

Do not remove threaded inserts (248 and 268, Figure 5-103, Sheet 2, Appendix).

i. ELECTRICAL CHASSIS DISASSEMBLY.

Step 1. Refer to Figure 5-104 (Appendix) and raise the two paper support and brake drum assembly lock levers; lift the paper supply roll and paper support and brake drum (1 and 3) out of the electrical chassis.

Step 2. Grasp the knurled nuts on both ends of paper support and brake drum assembly and turn them counter to each other.

Step 3. Remove brake from (1) and slide out of paper supply roll; the paper support shaft assembly (3).

Step 4. Remove three lamps (38) by pressing in and turning counterclockwise.

Step 5. Unless parts replacement is necessary, further disassembly should not be attempted. Refer to Figure 5-104, Appendix if replacement of a defective part is required.

NOTE

Do not remove labels, as removal will destroy them.

(1) ELECTRONIC MODULE. - The electronic module (Figure 5-105) should not be disassembled. If a defective component is detected (using Electronic Module Trouble Shooting Chart 5-14) only the defective component should be removed. Refer to Paragraphs 5-5b (9) and (10) to remove and replace electronic module from chassis for necessary repairs.

(2) TRANSFORMER. - The encapsulated nature of the transformer prohibits disassembly or repair. Refer to transformer removal procedure Paragraphs 5-5b (11 and 12), to remove and replace a defective transformer.

(3) CHASSIS HARNESS DISASSEMBLY. - To remove the electrical chassis harness it is necessary to unsolder all connections to the electrical components in the electrical chassis. Refer to electrical chassis wiring diagram (Figure 5-107 or Figure 5-111) for location of connections and components

j. CLEANING. - Adequate cleaning is an essential factor in all maintenance and repair procedures. It is impossible to perform accurate inspections or adjustments of parts that are dirty or covered with dirty lubricants. Mechanical components may be cleaned by dipping and brushing them in petroleum solvent; Federal Specification P-S-661.

CAUTION

NEVER DIP MAIN SHAFT IN SOLVENT FOR ANY PURPOSE WITHOUT FIRST REMOVING ALL SEALED BEARINGS. RELUBRICATE ALL CLUTCHES WITH NON-FLUID OIL. NEVER DIP PRESEALED BEARINGS IN SOLVENT OR CLEAN ULTRASONICALLY. INDIVIDUAL SUBASSEMBLIES MAY BE CLEANED ULTRASONICALLY OR BY DIPPING IN SOLVENTS IF THEY CONTAIN NO SEALED BEARINGS. DO NOT ALLOW ANY PART WITH A LABEL (SUCH AS ROTARY MODE SWITCH) TO REMAIN IN CLEANING SOLVENT AS THE SOLVENT WILL LOOSEN THE ADHESIVE.

k. INSPECTION. - Inspection procedures for parts of teletypewriter sets consist primarily of visual inspections.

(1) MECHANICAL COMPONENTS. - Reject any part which shows wear, such as indicated by rounded edges on pawl tips, scoring of contact and bearing surfaces, etc. When shafts are loose in their bushings, indicated by eccentric rotation, bushings and/or shafts must be replaced. Distortion, cracking, and any other obvious defects in parts are causes for rejection. Refer to Paragraph 5-3(d), Scheduled Maintenance.

(2) ELECTRICAL COMPONENTS. - Check all electrical components for evidence of burning; check their mountings for tightness. Check all wiring connections for loose or cold-soldered joints.

l. LUBRICATION. - Teletypewriter sets are lubricated at the factory and normally will not require lubrication until 500 hours (approximately 3 weeks) operation time has elapsed. Lubricants to be used on teletypewriter sets are Standard Oil Beacon Lubricant No. 325, Specification Mil-G-3278A and Non-Fluid Oil, Mite Corporation, Part Number 34304. Frequency of lubrication and type of lubricant are indicated in Table 5-9.

CAUTION

DO NOT OVERLUBRICATE. APPLY ONE OR TWO DROPS OF OIL BY DIPPING A PIECE OF NO. 22 GAGE WIRE 1/2 INCH INTO THE OIL AND IMMEDIATELY TOUCH THE WIRE TO THE LUBRICATION POINT. THIS METHOD PREVENTS OVERLUBRICATION. APPLY LUBRICANT TO GEAR AND CAMS WITH A BRUSH, AND TO OTHER MOVING PARTS WITH AN APPLICATOR THAT WILL APPLY ONE DROP AT A TIME. AFTER APPLYING LUBRICANT, SPREAD IT EVENLY AND IMMEDIATELY REMOVE EXCESS LUBRICATION COMING IN CONTACT WITH OTHER THAN MOVING PARTS MAY CAUSE DAMAGE.

m. ASSEMBLY PROCEDURES. - Perform following assembly procedures in exact sequence indicated. Use extreme care when reassembling parts to avoid damaging adjacent parts or disturbing adjustments. Any special cleaning, inspection, or lubrication instructions will be included as part of the assembly procedures. Figure and index numbers used in procedures refer to parts location on referenced illustrations.

n. MARK AND SPACE CLUTCH RELEASE SELECTOR SHAFT, TIMING CAM SHAFT, AND BACKSTOP SHAFT ASSEMBLY.

(1) TIMING CAM SHAFT ASSEMBLY.

Step 1. Insert key (54) into first cam keyway on left end of timing cam shaft (64); slide timing cam (59) over the key (54).

Step 2. Assemble remaining four timing cams (59) in the same manner as the first cam (Step 1).

NOTE

Spring (60, Figure 5-91, Appendix) is installed on shaft between timing cams (59) in the position as shown.

Step 3. Slide spacer (61) onto timing cam shaft (64).

Step 4. Insert key (54) into keyway and slide timing cam shaft gear (62) into position.

Step 5. Secure cam assembly by pressing ring (63) into groove on timing cam shaft (64).

Step 6. Press bearing (58) onto timing cam shaft (64); then slide spacer (55) onto timing cam shaft (64).

Step 7. Insert key (54) into timing cam shaft (64); slide function clutch release cam (57) into position over the key and secure it with bowed retaining ring (56).

Step 8. Press bearing (66) into bearing retainer (67), slide spacer (65) onto timing cam shaft (64), and press both bearing (66) and bearing retainer (67) onto timing cam shaft (64).

Step 9. Insert timing cam shaft assembly into rear frame (8, Figure 5-92, Appendix) and secure it with three screws (22) and three lock washers (23).

(2) MARK AND SPACE CLUTCH RELEASE SELECTOR SHAFT ASSEMBLY.

NOTE

One clutch release arm (17) has a longer bushing than the remaining four clutch release arms (20). Other than the longer bushing in arm (17), the clutch release arms are identical.

Step 1. Slide a mark clutch release finger (34, Figure 5-91, Appendix) over hub on a mark clutch release arm assembly (17 or 20) secure with a retaining ring (19).

Step 2. Attach a safety spring (18) between mark clutch release arm assembly (17 or 20) and mark clutch release finger (34).

Step 3. Install a lock nut (14) on a clutch release finger adjustment screw (13) and install clutch release finger adjustment screw (13) in mark clutch release arm assembly (17 or 20).

Step 4. Assemble remaining clutch release assemblies as described in steps 1 through 3.

NOTE

> When performing Step 5, do not insert mark clutch release selector shaft all the way into rear frame; insert shaft in small increments from left to right as mark clutch release assemblies and type positioning cam followers are installed on shaft.

Step 5. Insert mark clutch release selector shaft (10) partially into the left side of rear frame (8, Figure 5-92, Appendix).

Step 6. Install two felt washers (12, Figure 5-91, Appendix), start clutch release arm assembly (15), type positioning cam follower (16), and felt washer (12) on mark clutch release selector shaft (10).

Step 7. Install a previously assembled mark clutch release arm assembly on release shaft (10).

Step 8. Install the remaining clutch release arm assemblies, type positioning cam followers (16), and felt washers (12) in the sequence shown in Figure 5-91, (Appendix).

NOTE

> Mark clutch release selector shaft (10) should just pass through the center bearing of rear frame after installation of the last mark clutch release assembly.

Step 9. Attach bell prevent lever (33) to letter-figures, cam follower assembly (22) using screw (31) and washer (32), then slide letters-figures cam follower assembly (22) onto mark clutch release selector shaft (10). Install screw (27), washer (32), and nut (29) on pulley carriage actuator (30), then install screw (27) and nut (28) on pulley carriage actuator (30).

Step 10. Slide felt washer (21) and line feed motion amplify link (23) onto mark clutch release selector shaft (10).

Step 11. Complete assembly of the mark clutch release assemblies by positioning all of the installed assemblies between their respective retaining ring grooves and secure them with eight retaining rings (11).

NOTE

> In the next steps, do not insert the space clutch release selector shaft (36) all the way into the rear frame; insert the shaft in small increments from left to right as the space clutch release assemblies and type positioning cam followers are installed on the shaft.

Step 12. Assemble space clutch release assemblies (each consisting of clutch release finger adjustment screw (13), locknut (14), safety spring (18), retaining ring (19), mark clutch release finger (38), and one of clutch release arms (39, 40, 41, or 43)) as described in Steps 1 through 3.

NOTE

> Clutch release arms (39, 40, 41, and 43) have different length bushings. Other than different bushing lengths, clutch release assemblies are identical.

Step 13. Insert space clutch release selector shaft (36, Figure 5-91, Appendix) partially into the left side of rear frame (8, Figure 5-92, Appendix).

Step 14. Install secondary number 3 cam follower (37, Figure 5-91, Appendix) and space number 3 clutch release assembly (39) on space selector shaft (36).

Step 15. Install type positioning cam follower (16) and felt washer (12) on space clutch release selector shaft (36).

Step 16. Refer to Figure 5-91 (Appendix) and install the remaining clutch release assemblies (40 and 41) on mark clutch release selector shaft (36).

NOTE

> Right-hand end of space clutch release selector shaft (36) should be passed through the center bearing of rear frame (8, Figure 5-92, Appendix) after the space number 1 clutch release assembly (41) is installed.

Step 17. Install two felt washers (50), print and function clutch release assembly (42), and felt washer (50) on space clutch release selector shaft (36).

Step 18. Slide line feed cam follower arm (44) onto line feed torque tube actuator (45).

Step 19. Install line feed cam follower arm clamping screw (49) into line feed cam follower arm (44) and tighten lightly; install line feed actuator assembly (45) and retaining ring (48) onto space clutch release selector shaft (36).

Step 20. Slide all clutch release assemblies into their respective positions between the retaining ring grooves and secure them with ten retaining rings (11).

Step 21. Fasten print and function clutch release arm spring (51) between print and function clutch release assembly (42) and the spring post on rear frame (8, Figure 5-92, Appendix).

Step 22. Install five inter-arm springs (35, Figure 5-91, Appendix), between the mark and space clutch release assemblies.

Step 23. Complete the assembly of the space clutch release assemblies by installing inter-arm spring (35) between start clutch release arm (15) and the tab on rear frame (8, Figure 5-92, Appendix).

NOTE

> The last inter-arm spring (35, Figure 5-91, Appendix) is stretched about 1/2 inch farther than the other inter-arm springs but is otherwise identical.

(3) BACKSTOP SHAFT ASSEMBLY.

Step 1. Install six clamp screws (6, Figure 5-91, Appendix) into six clamps (7); slide six clamps (7) onto six clutch backstop levers (5).

Step 2. Press a clutch backstop eccentric bushing (4) into each clutch backstop lever (5) and tighten clamp screws (6).

Step 3. Insert backstop shaft (1, Figure 5-91, Appendix) partially into left side of rear frame (8, Figure 5-92, Appendix) just far enough to install clutch backstops as was done with mark and space clutch release selector shafts.

Step 4. Install and secure five clutch backstop assemblies (from left to right) on backstop shaft (1, Figure 5-91, Appendix) repeating the following sequence five times; install retaining ring (8); clutch washers (2); and retaining ring (3).

NOTE

> Install each clutch backstop assembly just to the right of mark clutch release fingers. Backstop shaft (1) should just pass through center plate of rear frame (9, Figure 5-92, Appendix) as fifth clutch backstop assembly is installed.

Step 5. Install two felt washers (2, Figure 5-91, Appendix), retaining ring (3) and sixth clutch backstop assembly on backstop shaft (1) after the shaft passes through center plate of rear frame (8, Figure 5-92, Appendix); secure with retaining ring (8, Figure 5-91, Appendix).

Step 6. Attach five clutch backstop springs (9) between clutch backstop levers (5) and their respective attaching holes in rear frame (8, Figure 5-92, Appendix); attach print and function clutch backstop spring (9, Figure 5-91, Appendix) between its clutch backstop lever and backstop spring clip (11), (Figure 5-92, Appendix).

Step 7. Attach backstop spring clip (11) to rear frame (8) with screw (33) and washer (32).

Step 8. Snap timing cam wick (53, Figure 5-91, Appendix) on space clutch release selector shaft (36) between left and center plate of rear frame, positioning the wick so that it contacts timing cams; snap function timing cam wick (52) on space clutch release shaft (36) under function timing cam.

Step 9. Slide line feed pawl (25) onto line feed motion amplify link (23) and secure with retaining ring (24); connect line feed pawl spring (26) between post on line feed pawl (25) and hole in line feed motion amplify link (23).

o. THIRD REDUCTION PINION ASSEMBLY.

Step 1. Install ring (26, Figure 5-90, Appendix) in retainer on right-hand rear plate of frame (8, Figure 5-92, Appendix).

Step 2. Slide idler gear arm assembly (15, Figure 5-90, Appendix) onto rear frame and secure with ring (29).

Step 3. Press one bearing (25) onto the shaft of second reduction gear (28); slide spacer (27) onto second reduction gear (28).

Step 4. Slide second reduction gear (28) through retainer on rear plate of frame and press second bearing (25) onto second reduction gear (28).

Step 5. Check third reduction pinion (24) for pin hole; and then slide third reduction pinion (24) onto second reduction gear (28).

NOTE

> An etched location mark across the left face of third reduction pinion (24) and second reduction gear shaft (28) should be used to align pin holes in the following step.

Step 6. Support second reduction gear shaft (28); align holes in second reduction gear shaft (28) and third reduction pinion (24), and press in pin (23).

NOTE

> If pin (23) can not be pressed through holes in third reduction pinion (24) and second reduction gear shaft (28), rotate third reduction pinion (24) 180 degrees and reinsert pin (23).

p. IDLER GEAR ASSEMBLY.

Step 1. Install ring (18, Figure 5-90, Appendix) into idler gear (16).

Step 2. Press one idler gear bearing (17) onto post of idler gear arm assembly (15); slide idler gear (16) onto idler gear bearing (17).

Step 3. Slide spacer (19) onto post of idler arm assembly (15).

Step 4. Press one idler gear bearing (17) into idler gear (16); secure with ring (20).

Step 5. Slide idler gear stud (14) through idler gear assembly and secure with idler gear locknut (21).

q. V LEVER AND LINKAGE ASSEMBLY.

Step 1. Install first character adjustment screw (34, Figure 5-90, Appendix) into V lever of V lever shaft (35); secure with anti-turn nut (33).

Step 2. Install and secure bail eccentric (47) on automatic carriage return and line feed bail actuator (49) using screw (46).

Step 3. Install anti-turn nuts (40) and (40) and screws (38) and (38) into lock lever actuator arm (41) and automatic carriage return and line feed actuator arm (48).

Step 4. Install carriage return lock lever eccentric bushing (45) in carriage return lock lever (42) and secure with nut (39).

Step 5. Install two felt washers (37) on V lever shaft (35) and slowly slide shaft into rear frame (8, Figure 5-92, Appendix) while installing lock lever actuator arm (41, Figure 5-90, Appendix), carriage return lock lever (42), automatic carriage return and line feed bail actuator (49), and automatic carriage return and line feed actuator arm (48) on V lever shaft (35); secure with retaining rings (36).

NOTE

> Items 50, 51 and 52 are used on AN/UGC-38 units only. Refer to Figure 5-90, Appendix for assembly of parts 50, 51, and 52 on V lever shaft. Slot in recognition arm (51) accepts pin on bell prevent lever (33, Figure 5-91, Appendix).

Step 6. Attach carriage return and line feed bail actuator helical spring (44, Figure 5-90, Appendix) and lock lever actuator arm helical spring (43) to carriage return lock lever (42); extent spring (44) and attach it to automatic carriage return and line feed bail actuator (49); attach spring (43) to lock lever actuator arm (41).

r. REAR FRAME ASSEMBLY.

Step 1. Insert detent helical spring (26, Figure 5-92, Appendix), detent ball (27), and lock arm (25) into change gear post (29); secure with pin (28).

Step 2. Attach change gear post (29) to rear frame (8) with screw (31), lock washer (30), and retaining clip (7); apply locktite compound to the mating surfaces.

Step 3. Attach start cam lubricating wick assembly (19) to rear frame (8) with screw (21) and lock washer (20).

Step 4. Attach function helical spring (9) to bracket on rear frame (8).

Step 5. Attach function helical spring yoke link assembly (10) to function helical spring (9).

Step 6. Attach print helical spring (17) to two retaining plates (18), and attach rear retaining plate (18) to stud on frame (8) with retaining ring (6).

CAUTION

> ALIGN THE FUNCTION SPRING YOKE LINK ASSEMBLY PARALLEL TO THE FRAME TO AVOID ANY TWISTING MOTION OF THE CLEVIS PIN.

Step 7. Attach frame clamp pads (14 and 14) to frame clamps (13 and 24) with frame clamp screws (15 and 15).

Step 8. Attach frame clamps (13 and 24) to rear frame (8) with frame clamp stud pivots (12 and 12) and retaining rings (16 and 16).

Step 9. Install advance prevent stop spring (5) and secure with screws (4).

s. MOTOR AND MOTOR MOUNT ASSEMBLY.

Step 1. Slide motor fan (Figure 5-88, Appendix) onto motor shaft and secure with motor fan setscrew (1).

Step 2. Press bearing (6, Figure 5-90, Appendix) into motor mounting plate (13).

Step 3. Press bearing (6) onto first reduction gear (5).

Step 4. Insert first reduction gear (5) in motor mounting plate (13).

Step 5. Install bearing cup (12) over first reduction gear (5); then secure bearing cup (12) to motor mounting plate (13) using screws (10) and lock washers (11).

Step 6. Press pin (4) into first reduction gearshaft (5), so that pin protrudes the same distance from each side of first reduction gearshaft.

Step 7. Slide motor into cooling housing (6, Figure 5-87, Appendix) ensuring that cable is aligned with the cutout and that there is clearance between motor fan and rear of cooling housing.

Step 8. Install two screws (1) into cooling housing (6) and tighten temporarily.

Step 9. Align motor mounting plate (13, Figure 5-90, Appendix) with bottom of air outlet of cooling housing and attach motor to mounting plate using three screws (6, Figure 5-88, Appendix) and lock washers (7).

Step 10. Position motor assembly on rear frame and align mounting holes.

Step 11. Secure motor assembly to rear frame with three screws (3, Figure 5-90, Appendix), lock washers (2) and washers (1).

CAUTION

> A CLEARANCE SHOULD EXIST BETWEEN FUNCTION TIMING CAM FOLLOWER AND COOLING HOUSING (AFTER INSTALLATION OF MOTOR AND COOLING HOUSING ASSEMBLY) OR CAM SURFACE WILL INCUR EXCESSIVE WEAR.

Step 12. Align slot in speed change gear (7) with pin (4) and slide speed change gear onto shaft of first reduction gear (5); secure speed change gear with lock nut (8). Adjust idler gear assembly (16) to mesh with speed change gear (7) by loosening idler gear lock nut (21) and swinging assembly until the gears mesh; tighten lock nut when gears are properly meshed. There must be some (approximately .005-inches) backlash between gears.

t. SELECTOR ASSEMBLY CHECK AND INSTALLATION.

Step 1. Insert ends of two selector mark latch shafts (6, Figure 5-89, Appendix) and ends of two selector space latch shafts (11) into bearing in right-hand magnet frame assembly (10).

NOTE

> Spring tabs on mark latch shafts (6) are pointed downward and space latch shaft (11) spring tabs are pointed upward.

Step 2. Align bearing holes in left-hand magnet frame assembly (15) with other ends of selector mark latch shafts (6) and selector space latch shafts (11); press left-hand magnet frame assembly (15) toward right-hand magnet frame assembly (10).

Step 3. Attach cable strain relief bracket (18) to left-hand magnet frame assembly (15) using screw (16) and lock washer (17).

CAUTION

> WHEN PERFORMING STEP 4, PLACE THE SELECTOR ASSEMBLY ON A FLAT

SURFACE PRIOR TO TIGHTENING THE SELECTOR TIE ROD STUDS IN ORDER TO PREVENT TWISTING WHILE TIGHTENING.

Step 4. Slide selector tie rod studs (9) consecutively through outer frame of right-hand magnet frame assembly (10), outer frame plate spacers (2), inner frame of right-hand magnet frame assembly (10), inner frame plate spacers (8), inner plate of left-hand magnet frame assembly (15), outer frame plate spacers (2), and outer frame of left-hand magnet frame assembly (15), and secure with nuts (1).

NOTE

> Check the operation of the selector, as described in Steps 5 and 6, prior to installing the selector assembly in the rear frame.

Step 5. Apply force at point A on Figure 5-89 (Appendix) while applying force to the armature mark paddle latch (point B).

Step 6. Push the armature mark paddle latch under the armature and hold in position; then try to push the armature space paddle latch past the armature. If the armature space paddle latch bypasses the armature, the rod studs (9) must be freed by loosening nuts (1), the selector assembly must be realigned, and nuts (1) carefully retightened. Reverse space paddle procedure to check the armature mark paddle latch clearances.

Step 7. Repeat Steps 5 and 6 for the three remaining armature paddle latches.

Step 8. Attach the electrical hardware (12, 13, and 14) as shown in Figure 5-89 (Appendix).

Step 9. Install selector shaft bias springs (7) as shown in Figure 5-89, Appendix.

NOTE

> When performing Step 10, ensure that notches in outer frames of left-hand and right-hand magnet frame assemblies (15 and 10) are engaged with mark and space clutch release selector shafts (10 and 36, Figure 5-91, Appendix).

Step 10. Position the selector assembly in the rear frame, ensuring that the armature mark and space paddle latch portions of the selector mark and space latch shafts (6 and 11) do not bind or catch on any of the clutch release arms.

Step 11. Insert lock bar (5, Figure 5-89, Appendix) into left hole in rear frame wall and then slide to right to engage the hole in other rear frame wall.

Step 12. Secure lock bar (5) and selector assembly using screws (3) and lock washers (4).

u. BACK PLATE ASSEMBLY AND INSTALLATION.

Step 1. Insert rear lock screws (2, Figure 5-92, Appendix) into back plate (1).

Step 2. Secure rear lock screws with retaining rings (3).

Step 3. Position back plate against rear frame (8); then slide it to left to engage tabs on back plate clamping plates with slots in rear frame.

Step 4. Tighten six screws to secure back plate (1) to rear frame (8).

Step 5. Align holes in fan outlet duct assembly with those in back plate; install and tighten screws (2, Figure 5-87, Appendix), lock washers (3) and washers (4).

v. MAINSHAFT ASSEMBLY AND INSTALLATION.

(1) SELECTOR MAINSHAFT ASSEMBLY. - (Refer to Figure 5-85, Appendix.)

NOTE

> When assembled, clutch and cam assemblies on the selector mainshaft will be positioned in cam alphabetical order (from left to right, Figure 5-85, Appendix) as follows: A cam and start clutch assembly (20); B cam and lateral number 3 clutch (22); C cam and lateral number 4 clutch (23); D cam and lateral number 5 clutch (28); E cam and rotary number 2 clutch (27); and F cam and rotary number 1 clutch (26).

Step 1. Oil all clutch cavities and inner cam race with non-fluid oil prior to installing clutches on selector mainshaft (24).

Step 2. Insert 28 rollers (19) into cam on A cam and start clutch assembly (20).

Step 3. Insert four rollers (21) into four cavities of A cam and start clutch assembly (20).

Step 4. Install retaining ring (17) on selector mainshaft (24).

Step 5. Slide washer (18) onto selector mainshaft (24).

Step 6. Slide A cam and start clutch assembly (20) onto selector mainshaft (24), ensuring that none of 28 rollers (19) has moved out of position.

Step 7. Slide washer (18) onto selector mainshaft (24) and secure A cam and start clutch assembly (20) by installing retaining ring (17).

Step 8. Install clutches (22, 23, 28, 27, and 26) as described in Steps 2 through 7; refer to note preceding Step 1 for position of clutches on selector mainshaft.

Step 9. Press left-hand bearing (16) into left-hand bearing retainer (6).

Step 10. Install start clutch release adjustment set-screw (11) into start clutch backstop lever (12) so that approximately 3/32 inch of thread protrudes above upper surface of backstop lever (12).

Step 11. Install lock nut (10) on start clutch release adjustment setscrew (11).

Step 12. Install start clutch backstop eccentric bushing (9) into start clutch backstop lever (12).

Step 13. Slide clamp (7) onto start clutch backstop lever (12); temporarily secure with clamp screw (8).

Step 14. Slide start clutch backstop lever assembly (12), felt washer (13), and start clutch release latch (14) onto pin of range adjustment assembly (5); secure with retaining ring (15).

Step 15. Slide range adjustment assembly (5) onto left-hand bearing retainer (6) and then onto selector mainshaft (24).

Step 16. Attach start clutch backstop lever spring (4) between range adjustment assembly (5) and start clutch backstop lever assembly (12).

Step 17. Install woodruff key (3) into keyway of selector mainshaft (24).

Step 18. Slide printer helical gear (2) over woodruff key (3) on selector mainshaft (24); secure with retaining ring (1).

NOTE

Items 1, 2, and 3 are used on AN/UGC-41 units only.

Step 19. Slide spacer (25) into selector mainshaft (24).

(2) FUNCTION MAINSHAFT ASSEMBLY. - (Refer to Figure 5-86, Appendix.)

NOTE

When assembled, the clutch and cam assemblies on the function mainshaft will be positioned in cam alphabetical order (from left to right, Figure 5-86, Appendix) as follows: G and H cam and print function clutch (7); I cam and line feed clutch (9); J cam and letters figures clutch (17); K cam and carriage return clutch (15).

Step 1. Oil all clutch cavities and cam inner race with non-fluid oil prior to installing clutches on function mainshaft (14).

NOTE

In the following steps, the sequence will be starting from the right and working left as parts are installed on function mainshaft (14).

Step 2. Install retaining ring (4) in first groove on the right side of function mainshaft (14).

Step 3. Slide flat washer (5) onto function mainshaft (14).

Step 4. Insert 28 rollers (6) into K cam and carriage return clutch (15).

Step 5. Insert four rollers (8) into K cam and carriage return clutch (15).

Step 6. Slide K cam and carriage return clutch (15) onto function mainshaft (14), ensuring that none of the rollers has moved out of place.

Step 7. Secure K cam and carriage return clutch (15) with flat washer (5) and retaining ring (4).

Step 8. Assemble clutches (17, 9, and 7) as described in Steps 2 through 7; refer to note preceding Step 1 for position of clutches on function mainshaft.

Step 9. Slide spacer (3) onto function mainshaft (14); press center bearing (2) into center bearing retainer (1) and place them on function mainshaft (14).

Step 10. Insert third reduction gear key (12) into keyway in function mainshaft (14); install third reduction gear (13), ensuring that slot in third reduction gear is aligned with third reduction gear key.

Step 11. Press right-hand bearing (11) into right-hand bearing retainer (15), and place assembly onto function mainshaft (14).

(3) MAINSHAFT INSTALLATION.

Step 1. Engage key of selector mainshaft (24, Figure 5-85, Appendix) with keyway (14, Figure 5-86, Appendix) of function mainshaft.

Step 2. Carefully place mainshaft assembly in rear frame (8, Figure 5-92, Appendix) ensuring that none of backstops or other linkage obstruct entry of shaft.

Step 3. Ensure that backstops are resting on their respective clutches.

Step 4. Align timing marks on timing cam shaft gear and start clutch gear using the diagram prepared during disassembly (refer to Figure 4-11, Appendix, for location of timing marks only).

NOTE

Timing mark relationship has been established at the factory and should be maintained as long as no range calibration problems have been encountered.

w. FRONT FRAME ASSEMBLY.

(1) REAR SIDE ASSEMBLY.

Step 1. Insert straight pin (44, Figure 5-101, Appendix) into front frame assembly (46); attach line feed shift lever (39) to straight pin (44); secure with retaining ring (40).

Step 2. Insert rotary cable adjustment screw (45) through top bracket of front frame assembly (46); then through top half of rotary cable adjustment bracket (42), nylon lock block (41), the bottom half of rotary cable adjustment bracket (42), and the bottom half of the bracket on front frame assembly (46).

Step 3. Secure rotary cable adjustment screw (45) in rotary cable adjustment bracket (42) with retaining ring (43).

Step 4. Insert letters-figures cam follower stroke adjustment screw (38) approximately halfway into bracket of front frame assembly (46).

Step 5. Insert shaft (37) through front frame assembly (46); install spacer (36), pulley assembly (35), spacer (34) and as shaft (37) is advanced through tab on front frame, secure with retaining ring (33).

Step 6. Install number 3 lateral stroke adjustment screw (29), nut (30), and lock washer (31) on front frame assembly (46).

Step 7. Install two remaining lateral stroke adjustment screws (32), nuts (30), and lock washers (31) on front frame assembly (46).

Step 8. Install two rotary stroke adjustment screws (32), nuts (30) and lock washers (31) on front frame assembly (46).

Step 9. Position a pulley (11) and its spacers (4) into a carriage (7).

Step 10. Insert rod (5A) through carriage (7), pulley (11), and spacers (4).

Step 11. Insert a carriage clip (8), a sleeve spacer (9) and a retaining ring (10) on rod (5A).

Step 12. Insert a carriage pin (1) through hole in front frame assembly (46) and rod (5A) with carriage (7) and pulley (11) to rear of front frame wall (as illustrated).

Step 13. Secure carriage pin (1) by inserting retaining rings (2) on either side of rod (5A).

Step 14. Repeat Steps 8 through 13 for remaining rotary pulley carriage and pin assembly.

Step 15. Insert a spacer (4), a pulley (11), a spacer (4), and a retaining ring (3) on a rod (5).

Step 16. Insert rod (5) through front frame wall and attach a carriage (6), a carriage clip (8), a sleeve spacer (9) and a retaining ring (10).

Step 17. Insert a carriage pin (1) through hole in front frame assembly (46) and rod (5).

Step 18. Secure carriage pin (1) by inserting retaining rings (2) on either side of rod (5).

Step 19. Repeat Steps 14 through 17 to assemble the two remaining lateral pulley carriage and pin assemblies.

Step 20. Insert printer keyboard idler gear bushing (17) into printer keyboard idler gear (18).

Step 21. Insert screw (16) through bushing (17), washer (19), idler gear plate (20) and front frame assembly (46); secure with lock washer (21) and nut (22).

(2) FRONT SIDE ASSEMBLY.

NOTE

Cable and belt pulley bearings are pressed into pulleys at the factory. Entire pulley assembly should be replaced if defective.

Step 1. Slide three pulley assemblies (2, Figure 5-98, Appendix) on the posts on the front frame and pin (17): secure with three grip rings (1).

Step 2. Insert pin (17) into front frame and secure with nut (45).

Step 3. Slide two sleeve spacers (41), two lateral control belt pulley assemblies (42), and two sleeve spacers (41) onto two pins on front frame; secure with two grip rings (1).

Step 4. Push (black) letters-figures carriage pulley assembly (2A) into letters-figures pulley carriage (20).

Step 5. Insert letters-figures pulley carriage rod (19) through letters-figures pulley carriage (20).

Step 6. Slide spring clip (21) and sleeve spacer (22) onto letters-figures carriage pulley rod (19); secure with retaining ring (23).

Step 7. Insert drilled head of letters-figures pulley carriage rod (19) through hole in front frame; slide straight pin (24) through tabs of riveted casting assembly mounted on front frame and letters-figures pulley carriage rod (19).

Step 8. Install two retaining rings (18) on straight pin (24).

Step 9. Slide return cable pulley (2), onto pin of return cable pulley bracket (16), secure with retaining ring (1).

Step 10. Attach return cable pulley bracket assembly (16) to front frame using screw (15).

Step 11. Attach two frame clamp pads (29) and two frame clamp screws (28) to two frame clamps (27).

Step 12. Attach two frame clamp assemblies (27) to the front frame using two clamp pivots (30) and two retaining rings (26).

Step 13. Attach print hammer actuator link guide bracket (3) to front frame using screw (4).

Step 14. Slide printer hammer release (6) and washer (53) over print hammer release shaft (5).

Step 15. Insert print hammer release shaft (5) into front frame; secure with flat washer (51) and self-locking nut (50).

Step 16. Attach print hammer release stop lever (8) to front frame using screw (7).

Step 17. Attach two printer electrical chassis locators (48) to front frame using lock nuts (10).

Step 18. Screw post (65) to frame using lockwasher (63) and washer (64).

Step 19. Install pulley (43) on post (65) and secure with retaining ring (66).

Step 20. Screw bracket (56) to frame using two screws (54) and two washers (55).

Step 21. Attach lateral positioning belt yoke (59) to bracket (56) with screw (57) and nut (58).

Step 22. Insert pin (60) through lateral positioning belt yoke (59) and through loop in lateral positioning belt (62); and secure pin (60) with two retaining rings (61).

Step 23. Attach line feed shift (34) to line feed shift arm (35) with retaining rings (36).

Step 24. Attach line feed spacing shift bracket (33) to line feed shift arm (35); secure with washer (39) and retaining ring (40).

Step 25. Install shift lever adjustment screw (32) in line feed spacing shift bracket (33).

Step 26. Secure line feed spacing arm assembly (consists of 32, 33, 35, 36, 39 and 40) to the front frame using three lock washers (38) and screws (37).

Step 27. Attach print lever and character advance lever shaft support bracket assembly (47) to front frame using lock washers (13) and screws (14).

x. FUNCTION SLIDE ASSEMBLY.

Step 1. Attach lateral control function slide (68, Figure 5-99, Appendix) to support (67) using two spacers (62), clips (63), lockwashers (64) and screws (65).

Step 2. Attach rotary function slide (66) to support (67) using two spacers (62), clips (63), lock washers (64), and screws (65).

CAUTION

MAKE CERTAIN THAT SPACERS (60) ARE INSTALLED UNDER LATERAL AND ROTARY FUNCTION SLIDES, OTHERWISE FUNCTION SLIDES WILL BIND DURING OPERATION.

Step 3. Position function slide assembly (59) and three spacers (60) on the front surface of the front frame; secure with three screws (61) by passing screws through front frame, from the rear to front.

y. STRIP ASSEMBLY.

(1) LATERAL CONTROL BELT STRIP ASSEMBLY.

Step 1. Install lateral control belt pulley assembly (69, Figure 5-99, Appendix) in fork (74): secure with pin (73) and retaining ring (72).

Step 2. Insert slack takeup slide (77) into lateral control strip (76).

Step 3. Slide slack takeup spring (75) onto shaft of fork (74); then pass shaft through lateral control strip (76) and screw into slack takeup slide (77).

Step 4. Attach lateral positioning belt (80) to lateral control strip (85) by inserting pin (79) through control strip (76), lateral positioning belt loop (80) and other side of lateral control strip (76) and securing pin (79) with retaining ring (78).

Step 5. Position lateral control strip (76) over post of lateral control function slide (68); secure with retaining ring (55).

NOTE

Refer to lateral positioning belt replacement Paragraph 5-5c(7) for threading procedure.

(2) ROTARY CABLE STRIP ASSEMBLY.

Step 1. Place rotary cable pulley (57, Figure 5-99, Appendix) in rotary strip (54); secure with pin (58) and retaining ring (56).

Step 2. Attach rotary positioning belt (50) to rotary strip (54) using pin (51) and retaining ring (52).

Step 3. Place rotary strip (54) over center post of rotary function slide (66); secure with retaining ring (55).

Step 4. Attach safety spring (53) to post of rotary strip (54) and center post of rotary function slide (66).

NOTE

Refer to rotary positioning belt replacement Paragraph 5-5c(8) for threading procedure.

z. FUNCTION BACKSTOP ASSEMBLY.

Step 1. Place line feed sensing finger lever (10, Figure 5-99, Appendix) on pin on left side of line feed clutch release arm (11); secure with retaining ring (8).

Step 2. Place off-line, line feed sensing finger lever (13) on pin on right side of line feed clutch release arm (11); secure with retaining ring (8).

Step 3. Assemble remaining function clutch release arms (15, 17, 18, 21, 30 and 32) as described in Steps 1 and 2.

Step 4. Align keyway of function clutch release shaft (33) with key of function clutch release and backstop frame assembly (35) when installing function clutch release shaft (33) in function clutch release and backstop frame assembly (35); slide function clutch release shaft (33) into: left side of function clutch release and backstop frame assembly (35), spacer (9), line feed clutch release arm (11), figures clutch release arm (15), spacer (9), bell advance suppression arm (17), spacer (9), letters clutch release arm (18), carriage return clutch release arm (21), spacer (9), and then the right side of function clutch release and backstop frame assembly (35).

Step 5. Install spacer (9), space arm (32), spacer (9), and blank advance suppression arm (30) on function clutch release shaft (33).

Step 6. Install retaining rings (34) in their respective grooves in function clutch release shaft (33).

Step 7. Install five function advance prevent adjustment screws (26) in nylon locking plate (27) and advance prevent bail carriage return bar (28).

Step 8. Position advance prevent bail carriage return bar (28) so that its arms are in contact with ends of function clutch release shaft (33); insert advance prevent bail carriage return bar shaft (29) through function clutch release shaft (33).

Step 9. Secure advance prevent bail carriage return bar shaft (29) by installing and tightening clamp (2) and clamp setscrew (1) on advance prevent bail carriage return bar (28); check that advance prevent bail carriage return bar shaft (29) is flush with both ends of advance prevent bail carriage return bar (28).

Step 10. Insert function clutch release arm stop shaft (36) into function clutch release and backstop frame assembly (35); secure with retaining rings (37).

Step 11. Slide print prevent rod lever shaft assembly (48) through function clutch release arm shaft (36); secure with retaining ring (39).

Step 12. Slide left-hand print prevent rod actuator arm (49) onto left side of print prevent rod lever shaft assembly (48) and temporarily secure with print prevent rod actuator arm screw (41).

Step 13. Slide right-hand print prevent rod actuator arm (40) onto right side of print prevent rod lever shaft (48) and temporarily secure with print prevent rod actuator arm screw (41).

Step 14. Install seven print prevent adjustment screws (46) through print prevent rod (42) and lock strip (45).

Step 15. Attach print prevent rod (42) to left-hand and right-hand print prevent rod actuator arms (49) and (40) using flat washers (43) and screws (44).

Step 16. Slide clamp (2) onto function backstop (3); install function backstop eccentric bushing (4) into function backstop (3); install and tighten clamp setscrew (1).

Step 17. Repeat Step 16 for remaining function backstops (3), making certain that the carriage return backstop eccentric bushings are installed exactly as shown in Figure 5-99, Appendix.

Step 18. Insert function backstop shaft (7) through left side of function clutch release and backstop frame assembly (35), line feed backstop (3), sleeve spacer (5), letters-figures backstop (3), and carriage return backstop (3); secure function backstop shaft (7) by installing retaining ring (6).

Step 19. Grasp entire function backstop assembly and align the function sensing finger levers with their respective slots in function slide support (67), position function clutch release and backstop frame assembly (35) against the front frame assembly and secure with three screws (47).

Step 20. Attach three function backstop springs (25) to function backstops (3) and pins of function clutch release and backstop frame assembly (35).

Step 21. Attach print prevent rod actuator arm bias spring (38) to right-hand print prevent rod actuator arm (40) and spring post on right side of function clutch release and backstop frame assembly (35).

Step 22. Attach function clutch release arm return helical springs (22) between blank advance suppression arm (30) and space arm (32) and their respective spring clips (90); attach clips (90) to front frame assembly.

Step 23. Attach function clutch release arm return helical springs (22) between clutch release arms (11, 15, 17, 18, and 21) and their respective spring clips (90); attach clips to front frame assembly.

Step 24. Attach function sensing finger lever helical spring (12) to blank sensing finger lever (31) and blank advance suppression arm (30).

Step 25. Attach function sensing finger lever helical spring (12) to function sensing finger lever (14) and space arm (32).

Step 26. Attach function sensing finger lever helical spring (12) to line feed sensing finger lever (10) and line feed clutch release arm (11).

Step 27. Attach function sensing finger lever helical spring (12) to off-line feed sensing finger lever (13) and line feed clutch release arm (11).

Step 28. Attach function sensing finger lever helical spring (12) to function sensing finger lever (14) and figures clutch release arm (15).

Step 29. Attach function sensing finger lever helical spring (12) to bell actuator sensing finger lever (16) and bell advance suppression arm (17).

Step 30. Attach function sensing finger lever helical spring (12) to function sensing finger lever (14) and letters clutch release arm (18).

Step 31. Attach off-line letters sensing finger lever spring (23) to off-line letters sensing finger lever (19) and letters clutch release arm (18).

Step 32. Attach function sensing finger lever helical spring (12) to off-line carriage return sensing finger lever (20) and carriage return clutch release arm (21).

Step 33. Attach function sensing finger lever helical spring (12) to carriage return sensing finger lever (10) and carriage return clutch release arm (21).

Step 34. Slide function sensing finger lever stop strip (89) between the springs and function sensing fingers levers, with flat edge against front frame assembly.

Step 35. Install nut (84) on print prevent stop adjustment set screw (85) and install setscrew in off-line function slide assembly (87).

Step 36. Install off-line function return helical springs (86) between off-line function slide assembly (87) and the tabs on four function levers.

Step 37. Attach bell lever assembly (88) on off-line function slide assembly (87) and secure with retaining ring (81); insert bell actuator connecting rod (24) into bell advance suppression arm (17) and bell lever assembly (88); attach function clutch release arm return helical spring (22) to end of bell actuator connecting rod (24) and spring clip (90).

Step 38. Position off-line function slide assembly (87) on front frame assembly; align holes of function sensing finger lever stop strip and off-line function slide with front frame; secure entire assembly with four screws (46, Figure 5-98, Appendix).

Step 39. Insert latch spring (8, Figure 5-100, Appendix) on post of latch (7).

Step 40. Insert latch (7) post through hole in carriage return lever (9) and secure with retaining ring (11).

NOTE

> Latch spring (8) hooks should be engaged with the upper edge of carriage return lever (9) and right edge of latch (7).

Step 41. Insert carriage return lever (9) on post of line feed lever (13) and secure with retaining ring (12).

Step 42. Insert carriage return lever (9) and line feed lever (13) on posts located on off-line function slide bracket (1) and secure with retaining rings (14 and 10).

Step 43. Insert cancellation lever (2) on post located on off-line function slide bracket (1) and secure with retaining ring (3).

NOTE

> Leg of cancellation lever (2) should be positioned below carriage return lever (9) and to left of tab latch (7).

Step 44. Attach cancellation spring (4) to right tab on cancellation lever (2) and tab on carriage return lever (9).

Step 45. Insert adjustable slide (18), washer (5), lock washer (6) on threaded post of off-line function slide bracket (1) and secure with nut (16).

Step 46. Secure eccentric (17) with screw (15) to off-line function slide bracket (1).

NOTE

> A threaded insert is provided in off-line function slide bracket (1) for eccentric mounting screw (15).

aa. ADVANCE DRUM ASSEMBLY AND INSTALLATION.

Step 1. Install internal spacer sleeve (7, Figure 5-97, Appendix) in advance drum (9).

Step 2. Press ball bearing (6) into rear of advance drum (9).

Step 3. Install ball bearing (6) in front side of advance drum (9).

Step 4. Attach ratchet (8) to advance drum (9) with screw (12), and slide advance drum assembly (9), washer (13), recessed washer (14) onto shaft on advance bracket (5); secure with retaining ring (15).

Step 5. Press two dowel pins (1) into rotary pulley shim (2) so that they are flush with right side of rotary pulley shim.

Step 6. Slide pulley (3) onto shaft of rotary pulley shim (2).

Step 7. Secure pulley (3) with grip ring (4).

Step 8. Loosely install three cable clamps (10) on advance drum (9) using lock washers (11) and cable clamp screws (12).

Step 9. Align mounting hole in check pawl guide bracket (87) with holes in rotary cable pulley shim assembly (2) and advance drum bracket (5); attach check pawl guide bracket (87), rotary cable pulley shim assembly (2), character advance guide (88) and advance drum bracket (5) to holes in front frame using screws (89).

ab. FRONT FRAME, MAINSHAFT AND REAR ASSEMBLY.

Step 1. Rest rear frame assembly (Figure 5-92, Appendix) on its back plate and ensure that mainshaft is still properly located in the three bearing cutouts.

Step 2. Position front frame assembly over mainshaft and rear frame so that top of front frame engages rear frame first.

CAUTION

WHEN PERFORMING STEP 3, ENSURE THAT LINE FEED PAWL IS PROPERLY

ALIGNED AND ENGAGED WITH ITS RESPECTIVE SLOT IN FRONT FRAME, AND THAT FUNCTION SENSING FINGER LEVERS ARE BEHIND AUTOMATIC CARRIAGE RETURN AND LINE FEED BAIL ACTUATOR.

Step 3. Engage all type positioning cam followers with their respective carriage pulleys, then slowly apply pressure toward back plate and engage bottom row of type positioning cam followers with their respective carriage pulleys.

CAUTION

WHEN PERFORMING STEP 4, IF FRONT AND REAR FRAMES DO NOT FIT TOGETHER PROPERLY, CHECK FOLLOWING BEFORE PROCEEDING.

(1) Range adjustment assembly (5, Figure 5-85, Appendix) must be between the two pins on front frame assembly.

(2) All type positioning cam followers and letters-figures carriage pulley arm must be engaged with their respective carriage pulleys.

(3) Line feed pawl must not be jammed under front frame.

(4) Function sensing finger levers must be behind the automatic carriage return and line feed bail actuator.

(5) There must be no other interference between any parts on either frame.

Step 4. Press front and rear frames together, ensuring that corner of advance drum bracket (5, Figure 5-97, Appendix) does not engage first character adjustment screw (34, Figure 5-90, Appendix).

Step 5. Engage and tighten six frame clamps (three on bottom and three on top).

Step 6. Attach secondary number 3 cam follower spring (26, Figure 5-101, Appendix) between post on rear of front frame assembly (46) and post on secondary number 3 cam follower (37, Figure 5-91, Appendix).

ac. TAKEUP BRACKET ASSEMBLY AND INSTALLATION.

Step 1. Press nylon bearings (6, Figure 5-91, Appendix) into takeup drum (7).

Step 2. Install carriage return, spiral spring (8) in takeup drum (7), engaging hook of carriage return spiral spring with slot in takeup drum; loosely install lateral control belt clamp (3) using screw (1) and lock washer (2).

Step 3. Slide takeup drum shaft (9) into takeup drum assembly and secure with washer (5) and retaining ring (4).

Step 4. Engage carriage return spring mounting cup (10) with carriage return spiral spring (8); secure with carriage return spring holder (11).

Step 5. Slide takeup drum shaft (9) through mounting hole in takeup drum bracket assembly (23) and engage two tabs of carriage return spring mounting cup (10) with the appropriate holes in takeup drum bracket assembly (23). Apply light tension to carriage return spiral spring, to prevent it from disengaging carriage return spring mounting cup, by aligning hole in takeup drum with hole in bracket and passing a pin through both holes.

Step 6. Secure takeup drum assembly with lock washer (24) and nut (25).

Step 7. Slide friction washer (45), belt pulley (46), washer (54) and spring (55) onto left-hand pulley bracket (44); secure with two nuts (56 and 57).

Step 8. Install cable pulley assembly (47), onto takeup drum bracket assembly (23); secure with ring (19).

Step 9. Attach left-hand belt pulley bracket (44) to takeup drum bracket assembly (23) using two screws (48).

Step 10. Install belt pulley assembly (15) on takeup arm (14); secure with spacer (18) and grip ring (19).

Step 11. Attach takeup arm (14) to takeup drum bracket assembly (23) using flat washer (13) and ring (12).

Step 12. Install lateral tension helical spring (22) on post of takeup drum bracket assembly (23) and pin of takeup arm (14), secure with flat washers (21) and retaining rings (20).

Step 13. Insert range dial (51) into takeup drum bracket assembly (23), range finder lock helical spring (28), and conical range finder slide lock (27), install range finder knob (52) into range dial (51); press groove pin (26) through conical range finder slide lock (27) and into range finder knob (52).

Step 14. Insert range finder lock lever shaft (29) through range finder lock lever bracket (32), range finder lock lever (30), and range finder lock lever spring (31); secure with retaining ring (33).

Step 15. Install range finder lock lever assembly (30) on takeup drum bracket assembly (23) with screw (50) and flat washer (49).

Step 16. Preload takeup drum by turning it counterclockwise two to three complete turns. Insert an allen wrench or some similar object into the hole in the takeup drum and hole in takeup drum bracket to prevent takeup drum from unwinding.

ad. PRINT LEVER SHAFT INSTALLATION.

Step 1. Install bearing (38, Figure 5-93, Appendix) into print lever shaft (39).

Step 2. Install two felt washers (41) on print lever shaft assembly (39) and slide them to extreme left side of print lever shaft assembly.

Step 3. Install print prevent arm clamping screw (42) in print prevent arm (34), print cam follower clamping screw (43) in print cam follower (35), and print spring arm clamping screw (42) in print spring arm (36).

NOTE

When performing Step 4, slide print spring arm (36), print cam follower assembly (35), and print prevent arm assembly (34) onto print prevent lever shaft assembly (37) as it is installed in front frame.

Step 4. Install print lever shaft assembly (37) through hole in left side of front frame (Figure 5-98, Appendix).

Step 5. Attach print spring retaining plate (18, Figure 5-92, Appendix) to print spring arm and (36, Figure 5-93, Appendix) secure with retaining ring (20).

Step 6. Install retaining rings (40) in their appropriate grooves on print lever shaft assembly (37).

Step 7. Attach takeup drum and linkage assembly (Figure 5-93, Appendix) to front frame (Figure 5-98, Appendix) using two screws (49, Figure 5-98, Appendix) and two screws (9).

ae. FUNCTION SHAFT AND RIGHT-HAND SECTION ASSEMBLY AND INSTALLATION.

Step 1. Oil felt strip (36, Figure 5-97, Appendix) and then install it on character advance lever shaft assembly (52).

Step 2. Partially install character advance lever shaft assembly (52) through hole in right side of front frame assembly (Figure 5-98, Appendix).

Step 3. Install lifter arm clamping screw (54) into lifter arm (53).

Step 4. Install two compression springs (84) in recesses of function lever (56), then place function bar (83) over ends of compression springs (84) and engage the slots of function bar (83) with the tabs of function lever (56).

CAUTION

WHEN PERFORMING STEP 5, DEPRESS FUNCTION BAR (83) PRIOR TO TURNING SPECIAL SCREWS (82). IF SCREWS ARE TURNED WITHOUT FIRST DISENGAGING FUNCTION BAR (83), THE LOCKING FEATURE WILL BE DESTROYED.

Step 5. Install special screws (82) in function lever (56) by compressing function bar and compression springs and then turning the special screws clockwise until there is 1/4-inch clearance between function bar and the function lever.

Step 6. Install function cam follower clamping screw (86) into function cam follower (85).

Step 7. Engage lifter arm spring (55) with holes in function lever (56) and lifter arm assembly (53).

Step 8. Install lifter arm (53), lifter arm spring (55), function lever (56), and function cam follower (85) on character advance lever shaft assembly (52) as it is installed in front frame assembly (Figure 5-98, Appendix).

Step 9. Install clamp setscrew (22, Figure 5-97, Appendix) in clamp (21).

Step 10. Slide bounce prevent lever eccentric bushing (20) into bounce prevent lever (23); then install clamp assembly on bounce prevent lever and lightly tighten clamp.

Step 11. Install carriage return cam follower clamping screw (16) in carriage return cam follower (17).

Step 12. Install retaining ring (18), shown to the right of bounce prevent lever (23), on carriage return shaft assembly (25).

Step 13. Slide bounce prevent lever (23) and felt washer (19) onto carriage return shaft assembly (25), then slide shaft partially through front frame assembly (Figure 5-98, Appendix).

Step 14. Install carriage return cam follower assembly (17, Figure 5-97, Appendix) on carriage return shaft assembly (25) as it is slid through front frame.

Step 15. Engage left side of carriage return shaft assembly (25) with hole in advance prevent bail carriage return bar shaft (29, Figure 5-99, Appendix); then engage pin of carriage return cam follower (17, Figure 5-97, Appendix) with hole in advance prevent bail carriage return bar (28, Figure 5-99, Appendix).

Step 16. Install retaining ring (18, Figure 5-97, Appendix) on carriage return shaft assembly (25).

Step 17. Attach bounce prevent lever spring (24) to bounce prevent lever (23) and advance drum bracket (5).

Step 18. Install felt strip (33) and felt strip clip (34) on lever of character advance lever shaft assembly (52); then crimp felt strip clip (34).

Step 19. Slide rotary cable pulley (76), onto pin of rotary cable pulley shaft assembly (77); secure with grip ring (75).

Step 20. Slide lateral control belt pulley (79) onto pin of lateral control belt pulley bracket (80); secure with grip ring (75).

Step 21. Attach rotary cable pulley shaft assembly (77), spacer bracket (78), and lateral control belt pulley bracket (80) on right side of front frame assembly (Figure 5-98, Appendix), using advance suppression latch mounting stud (73, Figure 5-97, Appendix) and screw (31, Figure 5-98, Appendix).

Step 22. Install felt washers (72, Figure 5-97, Appendix), advance suppression latch (71), and advance suppression latch eccentric bushing (70) on advance suppression latch mounting stud (73); secure with screw (69).

Step 23. Install check pawl tip (60) on check pawl (59) with two screws (63), lock washers (62), and washers (61).

Step 24. Install check pawl eccentric stud (58) on check pawl (59) using lock washer (64) and nut (65).

Step 25. Install spacer (68), check pawl assembly (59) and check pawl eccentric bushing (67) on front frame assembly (Figure 5-98, Appendix); secure with screw (66, Figure 5-97, Appendix).

Step 26. Install nut (48) on rotary detent pawl adjustment screw (47), then install screw (47) in rotary detent pawl (49) so that screw protrudes approximately 1/16 inch.

Step 27. Install washer (50), rotary detent pawl (49), felt washer (46), rotary detent pawl actuator arm (45) and rotary detent pawl eccentric bushing (44) on front frame assembly (Figure 5-98, Appendix); secure with screw (43, Figure 5-97, Appendix).

Step 28. Install character advance pawl (32) and character advance pawl eccentric bushing (31) on lever of character advance lever shaft assembly (52) using screw (30).

Step 29. Attach character advance pawl spring (35) to lever of character advance lever shaft assembly (52) and character advance pawl (32).

Step 30. Attach rotary detent pawl spring (51) to lever of character advance lever shaft assembly (52) and rotary detent pawl (49).

Step 31. Install index link (42) on rotary detent pawl actuator arm (45) and lever of character advance lever shaft assembly (52); secure with retaining rings (41), oil wicks (41A), and grip rings (41B).

Step 32. Install shim (37), advance prevent lever (38), felt washer (39) on character advance lever shaft assembly (52), secure with retaining ring (40).

Step 33. Attach check pawl spring (57) to post on check pawl assembly (59) and to advance suppression latch (71).

Step 34. Attach advance prevent lever spring (26) to advance prevent lever (32) and to lever of carriage return shaft assembly (25).

Step 35. Install spacer (27) and check pawl link (29) on lever of carriage return shaft assembly (25); secure with retaining ring (28) and check that check pawl link (29), is engaged with check pawl (59).

Step 36. Install lateral control belt (91), return cable (90), and print hammer cable (92) in this sequence as instructed in Paragraphs 5-4c(2), 5-4c(5), and 5-4c(4).

Step 37. Fasten function helical spring yoke link assembly (10, Figure 5-92, Appendix) to function lever (56, Figure 5-97, Appendix) using clevis pin (81).

Step 38. Position retaining plate (83, Figure 5-99, Appendix) so as to retain clevis pin (81, Figure 5-97, Appendix) without binding, and secure retaining plate (83, Figure 5-99, Appendix) with screw (82).

af. PAPER FEED ASSEMBLY AND INSTALLATION.

Step 1. Insert paper feed rubber roll (1, Figure 5-96, Appendix) into paper feed guide (3).

Step 2. Press bearings (8) into paper feed guide (3).

Step 3. Insert spacer (9) on left side of paper feed rubber roll (1) and secure with grip ring (24).

Step 4. Insert spacer (9) and paper feed detent and ratchet (11) on right side of paper feed rubber roll (1).

Step 5. Align holes in paper feed rubber roll (1) and paper feed detent and ratchet (11) and secure by pressing in roll pin (10).

Step 6. Insert detent spring (4) in detent (6) and push entire assembly onto stud on paper guide (3); secure with retaining ring (5).

Step 7. Hook long end of detent spring (4) to paper guide (3), and other end to detent (6).

Step 8. Slide left-hand pressure roller spring (19) on release shaft (20) and partially insert release shaft (20) in the left tab of paper guide (3).

Step 9. Slide four pressure rollers (15), right-hand pressure roller arm (14), and left-hand pressure roller arm (17) on pressure roller arm shaft (16).

Step 10. Insert pressure roller arm shaft assembly (16) between tabs on paper guide (3) and slide release shaft (20) through right and left-hand pressure roller arms (17 and 14).

NOTE

The release shaft (20) should go through two tabs on paper guide (3) and pressure roller arms (17 and 14).

Step 11. Insert right-hand pressure roller spring (12) on release shaft (20).

Step 12. Insert setscrews (13) in right and left-hand pressure roller arms (14 and 17) and tighten to secure assembly.

Step 13. Hook short ends of right and left pressure roller springs (12 and 19) in the grooves of pressure roller arm shaft (16). The long end should rest against paper guide (3).

Step 14. Insert pressure pad (22) into paper guide (3).

Step 15. Insert pressure pad hinge pins (18) through holes in pressure pad (22) and paper guide (3).

Step 16. Place pressure pad springs (21) over pressure pad hinge pins (18) and secure with retaining rings (7). The pressure pad springs (21) are loaded under tabs on paper guide (3).

Step 17. Insert paper feed assembly in printer front frame and secure with two screws (7, Figure 5-98, Appendix) and two paper guide retaining pins (11).

Step 18. Insert feed knob (25, Figure 5-96, Appendix) on paper feed rubber roll (1) shaft and secure with screw (23).

NOTE

If sprocket feed paper is used, install eight paper feed sprocket teeth (2).

ag. PRINT CYLINDER SHAFT ASSEMBLY.

Step 1. Install right hand bearing (13, Figure 5-95, Appendix) and spacer (12) on print cylinder shaft (23).

Step 2. Install index wheel (11) on shaft (23) and press pin (10) into print cylinder shaft (23).

Step 3. Align print cylinder (17) character strips "E" and "L" with dot on index wheel (11), and insert print cylinder (17) on print cylinder shaft (23).

Step 4. Insert rotary spring housing nylon washer (27) in rotary spring retainer (26).

Step 5. Insert rotary motion spring (28) into rotary spring retainer (26) by inserting outer end of rotary motion spring (28) into retainer slot and gradually winding spring into retainer.

Step 6. Insert felt washer (6A), threading flange (6), and bearing (13) on print cylinder shaft (23).

Step 7. Install print cylinder shaft (23) in front frame (refer to Figure 5-98, Appendix) by pressing bearings (13, Figure 5-95, Appendix) into slots in frame.

Step 8. Slide rotary spring retainer assembly (26) onto print cylinder shaft (23) insuring that tab on rotary motion spring (28) is engaged with slot in print cylinder shaft (23). (Refer to Figure 5-18.)

Step 9. Slide rotary motion spring nylon washer (29, Figure 5-95, Appendix) and rotary motion spring retaining washer (30) onto print cylinder shaft (23), and secure with grip ring (31).

Step 10. Install upper and lower clamps (4 and 5) around rotary spring retainer (26) on the outboard side of frame, and secure to threading flange (6) with screws (1), lock washers (2), and washers (3).

Step 11. Place right hand bearing retainer (16) inside of frame and around bearing (13). Secure with screw (14) and lock washer (15).

ah. PRINT CYLINDER YOKE SHAFT ASSEMBLY AND INSTALLATION.

Step 1. Place print cylinder yoke (9, Figure 5-95, Appendix) over print cylinder (17).

NOTE

Refer to Paragraph 5-5c(2) for installation of lateral control belt prior to installation of print cylinder yoke shaft (7).

Step 2. Insert print cylinder yoke shaft (7) through left side of front frame assembly, print cylinder yoke (9), and right side of front frame assembly.

Step 3. Secure with retaining ring (8).

ai. PRINT HAMMER SHAFT ASSEMBLY AND INSTALLATION.

Step 1. Slide hammer shaft assembly (37, Figure 5-95, Appendix) through holes in bracket and shaft assembly (24) and secure with screw (36) and anti-turn nut (25).

Step 2. Install hammer stop (40) on hammer shaft assembly (37) and secure with screw (38), locking washer (39), washer (41), and nut (42).

Step 3. Slide four felt washers (43) on hammer shaft assembly (37).

Step 4. Slide hammer (44) on hammer and bracket shaft assembly (37 and 24).

Step 5. Install right-hand hammer bracket (45) to hammer shaft (37). Secure with screw (46) and anti-turn nut (18).

Step 6. Attach right-hand hammer bracket (45) to threaded end of bracket and shaft assembly (24) with washer (47), lock washer (48), and screw (49).

NOTE

Apply Loctite "C" to screw (49) to ensure a vibration-proof bond.

Step 7. Slide two hammer shaft bearings (35) on ends of hammer shaft assembly (37) and slide hammer shaft bearings (35) into slots in front frame assembly (refer to Figure 5-98, Appendix).

Step 8. Hook ribbon guide (21, Figure 5-95, Appendix) on tab of hammer assembly (44), and insert sides of ribbon guide (21) in slots on hammer assembly (44).

Step 9. Insert hammer face (20) in hammer assembly (44) and secure with screw (19) and nut (22).

Step 10. Install print hammer actuator link (34) to stud on hammer shaft assembly (37) and secure with retaining ring (33).

Step 11. Hook print hammer return spring (50) to right hand hammer bracket (45) and to frame stud on front frame assembly (spring is shown, properly installed, in Figure 5-84, Appendix, (7)).

Step 12. Hook print hammer actuator link spring (32, Figure 5-95, Appendix) to print hammer actuator link (34) and to stud on front frame assembly.

aj. FRONT PLATE ASSEMBLY AND INSTALLATION.

Step 1. Mount right and left-hand ribbon guides (8 and 15, Figure 5-94, Appendix) to front plate (4) with washers (9) and screws (10).

Step 2. Attach bell (11) to front plate (4) with lock washer (12) and screw (13).

Step 3. Hook spring (14) to post and printer support on front plate (4).

Step 4. Attach front plate (4) to front frame assembly with screws (52, Figure 5-98, Appendix).

Step 5. Thread locking nuts (6, Figure 5-94, Appendix) on setscrews (7), and insert setscrews (7) through lock washers (5) and into front plate (4).

Step 6. Thread setscrews (7) in until they make contact with hammer shaft bearing (35, Figure 5-95, Appendix).

Step 7. Tighten hexnuts (6, Figure 5-94, Appendix)

ak. RIBBON FEED ASSEMBLY.

Step 1. Press two pins (25, Figure 5-102, Appendix) into gear shaft (26).

Step 2. Slide ribbon drive gear (27) on gear shaft (26) and align slots with pin (25).

Step 3. Slide gear shaft (26) into bushing on plate (28) keeping gear (27) to the right of bushing (as viewed from the front).

Step 4. Slide cam (24) and bracket (23) onto gear shaft (26).

Step 5. Install bracket (23) to plate assembly (28) with washer (22) and screw (21).

Step 6. Plate reversal bar (9) on plate (28).

NOTE

Ensure that washers (10 and 11) are placed in their respective positions under reversal bar (9).

Step 7. Secure reversal bar (9) to plate (28) with retaining rings (3).

Step 8. Place check pawl (8) on reversal bar (9) and secure to plate assembly (28) with retaining ring (5).

Step 9. Install power lever (14) and torsion spring (12) on shaft (28A); secure with retaining ring (13) and hook bent end of spring onto plate (28).

Step 10. Place drive pawl (4) over check pawl (8).

Step 11. Pass power lever stud (4A) through hole in power lever (14), and secure drive pawl (4) to power lever (14) by inserting retaining ring (3) on power lever stud (4A).

Step 12. Place spring washers (15) over flanges in plate (28), and insert right and left ribbon spool spindles (1 and 2) in holes.

Step 13. Place washers (19) on ribbon spool spindles (1 and 2) under plate (28).

Step 14. Secure ribbon spool spindles (1 and 2) with cotter pins (20).

Step 15. Install spool clips (30) by pressing into place.

Step 16. Install left and right-hand ribbon guides (29 and 18) to plate (28) with flat washers (17) and screws (16).

Step 17. Install drive pawl spring (6) and check pawl spring (7).

CAUTION

RIBBON GUIDES SHOULD BE FORMED SO THAT RIBBON TRAVEL IN EITHER DIRECTION IS IN CENTER OF GUIDES.

Step 18. Install ribbon feed assembly on top of printer, securing it with screws (2 and 9, Figure 5-82).

al. KEYBOARD ASSEMBLY.

Step 1. Position front support (236, Figure 5-103, sheet 2, Appendix) against left bottom frame (271); align spring pin (267) and secure with screws (238) and lock washers (239). Install solder lug (240) under one of screws (238) as shown in Figure 5-103, sheet 2, Appendix.

Step 2. Align spring pins (247) with their respective holes in front support (236) and right frame (250); secure with screws (238) and lock washers (239).

NOTE

Threaded inserts (248, 268) were not removed during disassembly.

Step 3. Assemble key lever leaf spring (241), key lever leaf spring mounting strip (244), and rear support (245); secure with screws (242) and lock washer (243).

Step 4. Attach rear support (245) to frames (271 and 250) using screws (238) and lock washers (239).

Step 5. Attach code bar guide (231, Figure 5-103, sheet 1, Appendix) to frames using screws (226) and lock washers (227).

Step 6. Assemble pulsing finger and prevent lever assembly as shown on sheet 5 of Figure 5-103 (Appendix).

Step 7. Attach pulsing finger and prevent lever assembly (114, Figure 5-103, sheet 1, Appendix) to left bottom frame using screw (118), shaft clamps (115 and 116), and pulsing finger adjustment shim (117).

NOTE

Keyboard code bar prevent lever (last lever on shaft) passes through opening in front support. Check freedom of motion by allowing unit to move back and forth by its own weight.

Step 8. Attach helical springs (112 and 113) between fingers and spring bar portion of code pulsing contact assembly (87).

Step 9. Attach master pulsing contact assembly (84) loosely to left bottom frame using two screws (92) and lock washers (93), center and tighten master pulsing contact assembly (84) as described in Paragraph 5-4e(8) Steps 13 and 14.

Step 10. Press straight pin (249, Figure 5-103, sheet 2, Appendix) into right frame (250).

Step 11. Insert bail support shaft (177, Figure 5-103, sheet 1, Appendix) into left bottom frame, and slide lever assembly (165) and grip ring (166) on shaft inside left frame casting.

Step 12. Install felt washer (176) and ring (175) on bail support (177) from inboard side of right frame (250) then install solenoid stop (224) on bail support (177) with nut (223) and screw (222).

Step 13. Insert and tighten setscrew (178), securing bail support shaft (177).

Step 14. Install ring (175) and felt washer (176) on straight pin (249, Figure 5-103, sheet 2, Appendix) on the inboard side of right bottom frame.

Step 15. Insert clutch release bail (174, Figure 5-103, sheet 1, Appendix) through left bottom and engage with straight pin (249, Figure 5-103, sheet 2, Appendix) and bail support shaft (177, Figure 5-103, sheet 1, Appendix).

Step 16. Insert cam follower clutch release eccentric (170) through felt washers (173), cam follower clutch release (169) and clutch release bail (174); secure with flat washer (172) and nut (171).

NOTE

Felt washers (173) are in channel of cam follower clutch release (169).

Step 17. Attach clutch release helical spring (167) to cam follower clutch release (169) and ring on prevent lever assembly (114).

Step 18. Assemble keyboard interlock solenoid assembly (205) referring to sheet 4 of Figure 5-103, Appendix.

Step 19. Insert repeat key shaft (201, Figure 5-103, sheet 1, Appendix) through right frame wall, interlock assembly bracket (205), grip ring (202), bearing (204) and left frame wall.

Step 20. Insert torsion spring (185) on hub of clutch release (184).

Step 21. Insert clutch release (184) on repeat key shaft (201).

Step 22. Insert lever (183) on repeat key shaft (201).

Step 23. Hook long portion of torsion spring (185) around forward edge of lever (183).

Step 24. Hook short end of torsion spring (185) on back edge of clutch release (184).

Step 25. Insert lever link (162) on pins located on lever assembly (165) and finger (183) and secure with retaining rings (163).

Step 26. Install repeat key actuator arm (180) on repeat key shaft and secure with repeat key actuator arm screw (181) and repeat key actuator arm nutplate (182).

Step 27. Assemble backstop eccentric shaft (261, Figure 5-103, sheet 2, Appendix), clutch backstop assembly (263) and retaining ring (262); then insert assembly through left top frame (270).

Step 28. Secure with backstop eccentric shaft setscrew (260).

Step 29. Attach backstop spring (94, Figure 5-103, sheet 1, Appendix) to clutch backstop assembly and retaining ring on prevent lever assembly (114).

Step 30. Insert code bars 1 through 5 (157 through 161) in their respective slots in code bar guide (231).

Step 31. Install top right code bar guide (234) against top right frame using lock washer (232) and screw (233).

Step 32. Align top right code bar guide (234) with code bars, then secure with screws (233).

Step 33. Engage keyboard code bar prevent lever (122, Figure 5-103, sheet 5, Appendix); with slots in code bars (1 through 5, Figure 5-103, sheet 1, Appendix); insert repeat key assembly (27) through front support.

Step 34. Install repeat key lever clamp (198) on repeat key shaft (201) and secure repeat key lever (27) to repeat key lever clamp (198) using screw (28); install repeat key stop (25) to repeat key lever (27) using screw (26).

Step 35. Secure repeat key lever clamp (198) to repeat key shaft (201) with screw (199) and clamp nut plate (200).

Step 36. Attach repeat key lever helical spring (24) to repeat key assembly (197) and to pin on right frame.

Step 37. Check repeat key lever (27) for freedom of motion.

Step 38. Install clutch assembly (106, Figure 5-103, sheet 3, Appendix) on keyboard drive shaft (111) and secure with clutch assembly setscrew (104); install clutching rollers (107) into clutch assembly (106).

Step 39. Install keyboard drive gear (110), sleeve spacer (109), and bearing (108) on keyboard drive shaft (111).

Step 40. Insert start pulse eccentric (102) into master pulsing cam (100) and attach master pulsing cam (100) to start-stop cam bushing (103) using screws (101).

Step 41. Install bearings (99) into start-stop cam bushing (103); slide pulsing cam assembly (105) onto start-stop cam bushing (103).

Step 42. Slide start-stop cam bushing (103), sleeve spacer (98), and bearing (97) onto keyboard drive shaft (111).

Step 43. Place keyboard cam shaft assembly (96, Figure 5-103, sheet 1, Appendix) into left bottom frame, and mount cam wick (254, Figure 5-103, sheet 2, Appendix) to frame with holder (251), bracket (255), lock washers (253), and screws (252).

Step 44. Secure code pulsing contact assembly (87, Figure 5-103, sheet 1, Appendix) to left bottom frame using two screws (88), lock washers (89), one terminal lug (90) and two flat washers (91); then secure slip connector contact assembly (85) to code pulsing contact assembly (87) using two screws (86).

NOTE

Ground lug (90) shown positioned under left screw (88) in illustration, should be positioned under right screw.

Step 45. Secure left top frame (270, Figure 5-103, sheet 2, Appendix) to left bottom frame (271) using screws (272) and lock washers (273).

Step 46. Install keyboard cover pad (14, Figure 5-103, sheet 1, Appendix) in keyboard cover (16).

Step 47. Install left and right-hand keyboard rails (1 and 5), secure with screws (2, 3, and 6) and lock washers (4 and 7).

Step 48. Install wear pad (83) by inserting its arms through the outermost slots in rear support (245, Figure 5-103, sheet 2, Appendix).

Step 49. Install key lever dust seals (82, Figure 5-103, sheet 1, Appendix) over each key lever to be installed.

Step 50. Press key tops on their appropriate key levers as shown on sheet 1 of Figure 5-103, Appendix.

Step 51. Install space bar (42) through outermost slots in front support (236, Figure 5-103, sheet 2, Appendix) and rear support (245).

Step 52. Insert space bar shaft (39, Figure 5-103, sheet 1, Appendix) through bracket holes on front support bracket and insert space bar levers (34 and 38) on either end of shaft (39); secure with lock washers (35 and 41) and nuts (36 and 40).

NOTE

Holes in space levers (34 and 38) engage pins on space bar (42).

Step 53. Secure keys by installing key retaining strip (31, Figure 5-103, sheet 1, Appendix) using screws (32) and lock washers (33).

Step 54. Assemble items (191, 192, 186) on switch bracket (194); attach switch bracket (194) to frame assembly using screws (195) and lock washers (196).

Step 55. Refer to keyboard wiring diagram 5-1 and solder all electrical connections.

Step 56. Install front key guide (43) to front support with screws (44).

Step 57. Install keyboard cover (16) and secure to front support with screws (13).

Step 58. Attach space bar safety guard cover (20) to front support and keyboard cover (16) using screws (22) and two screws (23).

Step 59. Attach right side cover (17) to right frame with screws (18) and lock washers (19).

am. ELECTRICAL CHASSIS ASSEMBLY.

Step 1. Replace three lamps (38, Figure 5-104, Appendix) by pressing in and turning clockwise.

Step 2. Insert paper support shaft assembly (3) through paper supply roll; place brake drum (1) on the end of paper support shaft assembly (3) and counter rotate brake drums until tight.

Step 3. Raise two paper support and brake drum assembly lock levers and install paper supply roll and paper support and brake drum assembly (consisting of part numbers 1 through 3) in electrical chassis; secure by pulling the two paper support and brake drum assembly lock levers down.

Step 4. Further assembly of the chassis at this point should be just to replace defective parts removed in disassembly. Use Figure 5-104, Appendix as a guide in reassembly of replacement parts.

(1) ELECTRONIC MODULE ASSEMBLY. - Due to the encapsulated nature of the electronic module it was not disassembled during the disassembly procedures. Replacement of individual defective components is performed only after troubleshooting the electronic module using Table 5-14, Electronic Module Trouble Shooting Chart. Refer to Figure 5-105, Appendix for illustration of electronic module components. Refer to Paragraph 5-5b(10) for electronic module installation procedure.

(2) TRANSFORMER ASSEMBLY. - The transformer is also an encapsulated assembly and disassembly is not possible. Replacement of a transformer can be performed by referring to Paragraphs 5-5b(11) and (12).

(3) CHASSIS HARNESS ASSEMBLY. - Refer to Chassis Wiring Diagram Figures 5-107 or 5-112 for assembly of electrical chassis harness into the electrical chassis.

5-6. REFERENCE DATA.

a. SEATING TORQUE VALUES. - Refer to the following list for the recommended seating torque for stainless steel cap screws.

Screw Size	Torque (inch-pounds)
2-56	3.8
3-48	5.7
4-40	8.0
5-40	12.0
6-32	15.0
8-32	28.0
10-32	45.0
1/4-20	95.0

To prevent permanent damage to the screws, do not exceed the above values. When pan head screws are installed into threaded inserts in frames use the same torque as specified for cap screws.

b. **TENSION VALUES.** - Refer to Table 5-18 for the tension values of the springs in the equipment.

5-7. **OVERALL SCHEMATIC AND WIRING DIAGRAMS.** - Refer to Appendix, Figure 5-106, for the overall schematic diagram and to Appendix, Figures 5-107, through 5-109 for the wiring diagrams for Teletypewriter Set AN/UGC-41. For Teleprinter Sets AN/UGC-38 and AN/UGC-40, refer to Appendix, Figure 5-110 for overall schematic diagram and to Appendix, Figures 5-108, and 5-111 for wiring diagrams.

TABLE 5-18. TENSION VALUES

FIGURE AND INDEX (APPENDIX)	ITEM	LOAD LENGTH (INCHES)	LOAD (OUNCES)
3-1(4*)	Helical Compression Spring	0.2187	6-8
4-5	Clutch Bias Compression Spring	0.156	3
4-30	Off-Line Function Button Spring	0.6562 0.8594	5±2 14±2
5-85(4)	Backstop Lever Spring	0.8750	32-36
5-89(7)	Selector Shaft Bias Spring	1.1406 ±0.0156	5.6432
5-90(43)	Lock Lever Actuator Arm Helical Spring	1.0625	3
5-90(44)	Automatic Carriage Return and Line Feed Bail Actuator Helical Spring	1.3125	7.5
5-91(9)	Clutch Backstop Spring	1.125	28
5-91(18)	Safety Spring	0.6875	60±5
5-91(26)	Line Feed Pawl Spring	1.375	3
5-91(35)	Inter-arm Spring	1.312	32-34
5-91(51)	Print and Function Clutch Release Arm Spring	1.0625-1/125	16-18
5-91(60)	Timing Cam Shaft Spring (Compression)	0.250	16-25
5-92(9)	Function Helical Spring	2.375 2.750	32±3.2 42±4.2
5-92(17)	Print Helical Spring	2.375 2.750	16±1.6 20±2.0
5-92(26)	Detent Helical Spring (Compression)	0.375	6
5-93(8)	Carriage Return Spiral Spring		16 in.-oz at 1 turn; 19-22 in.-oz at 4 turns
5-93(22)	Lateral Tension Helical Spring	0.640 (max deflection)	30±1
5-93(28)	Range Finder Lock Helical Spring (Compression)	0.500	15

*Part of copy window release mechanism

TABLE 5-18. TENSION VALUES (Cont)

FIGURE AND INDEX (APPENDIX)	ITEM	LOAD (LENGTH) (INCHES)	LOAD (OUNCES)
5-95(28)	Rotary Motion Spring		2.7 in.-oz at 4 turns
5-95(32)	Hammer Actuator Link Spring	0.500	2 to 3 oz
5-95(50)	Print Hammer Return Spring	1.1875	9-11
5-96(4)	Paper Feed Detent Torsion Spring		
5-96(12)	Paper Release Spring (Right)		18±2 oz
5-96(12 and 19)	Paper Pressure Release Lever Spring		
5-96(19)	Paper Release Spring (Left)		18±2 oz
5-97(24)	Bounce Prevent Lever Spring	1.6250 1.750	30 40
5-97(26)	Advance Prevent Lever Spring	1.125	5
5-97(35)	Character Advance Pawl Spring	0.5937 0.5312	9 7
5-97(51)	Rotary Detent Pawl Spring	1.125 1.1875	29 36
5-97(55)	Lifter Arm Spring	0.049	18
5-97(57)	Check Pawl Spring	0.78125	5.5±0.5
5-97(84)	Function Lever Compression Spring	0.375	32
5-99(12)	Function Sensing Finger Lever Helical Spring	0.625± 0.0312	8
5-99(22)	Function Clutch Release Arm Return Helical Spring	1.250 1.5625	5 8
5-99(23)	Off-Line Letters Sensing Finger Lever Spring	0.500± 0.0132	4
5-99(25)	Function Backstop Spring	1.000 1.0625	23 25
5-99(38)	Print Prevent Rod Actuator Arm Bias Spring	1.9375	1.5
5-99(53)	Slide Safety Spring	1.125	4.0
5-99(75)	Slack Takeup Spring (Compression)	1.000 0.437	3 8-10
5-99(86)	Off-Line Function Return Helical Spring	0.875	6
5-101(26)	Secondary No. 3 Cam Follower Spring	1.750	28±3
5-102(6)	Drive Pawl Spring	1.0	3.2±0.3
5-102(7)	Check Pawl Spring	0.5625	2.2±0.2

TABLE 5-18. TENSION VALUES (Cont)

FIGURE AND INDEX (APPENDIX)	ITEM	LOAD (LENGTH) (INCHES)	LOAD (OUNCES)
5-103(21) (Sheet 1)	Spring	0.4062 0.6562	6 12
5-103(24) (Sheet 1)	Repeat Key Lever Helical Spring	1.000	35±2
5-103(94) (Sheet 1)	Keyboard Backstop Spring	0.750	2.2±2
5-103(112) (Sheet 1)	Helical Spring	1.0312	15±2
5-103(113) (Sheet 1)	Helical Spring	1.000	24±2
5-103(167) (Sheet 1)	Clutch Release Helical Spring	1.0625	3
5-103(209) (Sheet 4)	Solenoid Spring	1.225	1.25
5-104(9)	Paper Brake Link Spring	1.000 1.1875	2.5 3
5-104(57*)	Contact Block (Breaker)		1.5 (to open)

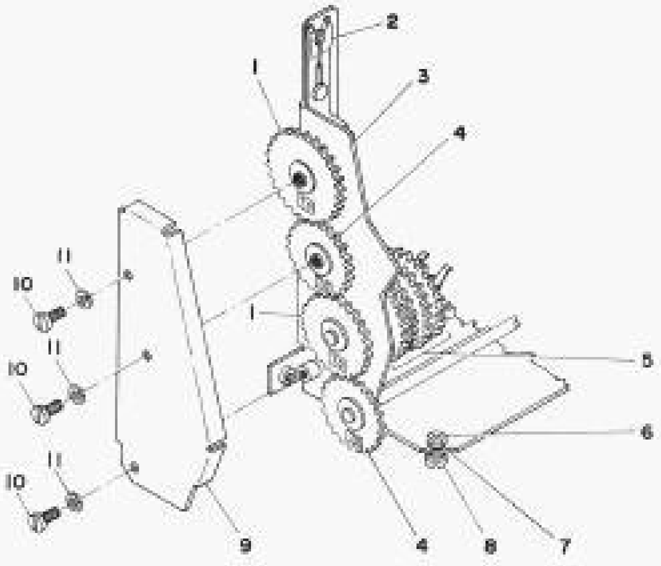
*Part of contact block.

5-8. MAINTENANCE FIXTURE, MITE PART NUMBER 37200 (Figure 5-112).

The purpose of the maintenance fixture is to provide motive power to the keyboard while allowing the maintenance technician to gain access to the top (Figure 5-113) or bottom (Figure 5-114) of the printer. The gear train in the fixture is interchangeable for use with 7.0 or 7.42 equipment. This is accomplished by removing the gear cover (9, Figure 5-112) sliding the gears (1 and 4) off posts, and replacing with the applicable gears for the desired code. The unused gears are stored on the maintenance fixture. The gears are stamped with the applicable code in addition to being color coded for easy identification; 7.0 gears are orange, and 7.42 gears are white.

a. **INSTALLATION OF MAINTENANCE FIXTURE.** - The maintenance fixture is attached to the chassis by two chassis slide locks (2, Figure 5-114) which slide into maintenance fixture mounting locators (8, Figure 5-112). The maintenance fixture is attached to the printer by two back plate screws (3, Figure 5-113) and (1, Figure 5-114) and a fixture slide lock (3, Figure 5-114) which slides into printer mounting locator (4).

b. **REMOVAL OF MAINTENANCE FIXTURE.** - The printer is first removed from the fixture by sliding fixture slide lock (2, Figure 5-112) to the rear and unscrewing the two printer backplate screws (3, Figure 5-113), and lifting the printer off the maintenance fixture. Then slide the chassis slide locks (2, Figure 5-114) outboard to disengage them from the maintenance mounting locators (8, Figure 5-112).



KEY	ITEM	KEY	ITEM
1	7.0 Gears	7	Lock Washer
2	Fixture Slide Lock	8	Mounting Locator
3	Gear Bracket	9	Gear Cover
4	7.0 Pinions	10	Gear Cover Screws
5	7.42 Gears and Pinions	11	Lock Washers
6	Nut		

Figure 5-112. Maintenance Fixture

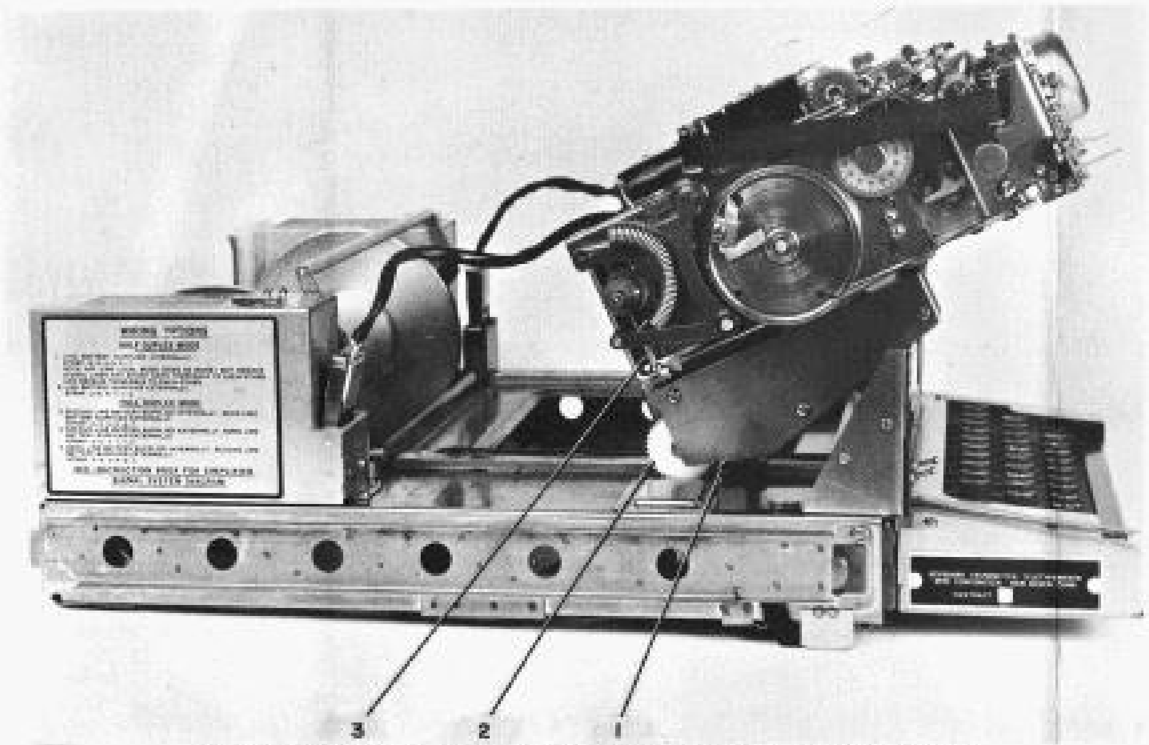
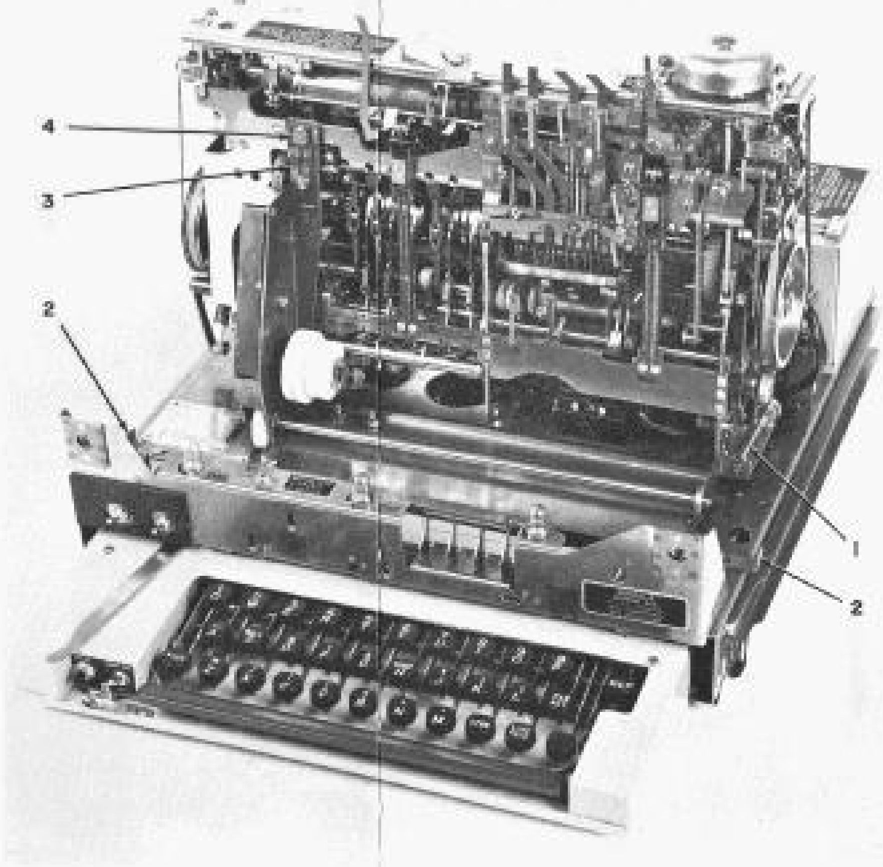


Figure 5-113. Typical Maintenance Fixture Installation (Tilted Position)



KEY	ITEM	KEY	ITEM
1	Back Plate Screw	3	Fixture Slide Lock
2	Chassis Slide Locks	4	Mounting Locator

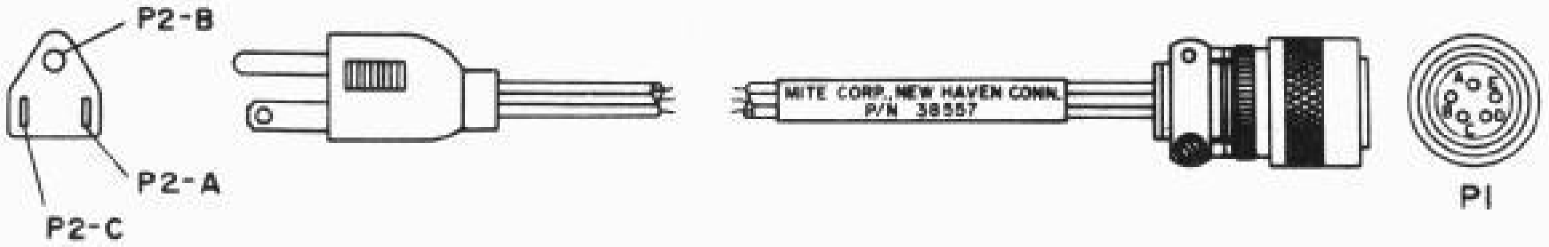
Figure 5-114. Typical Maintenance Fixture Installation (Printer 90 Degrees off Chassis for Servicing)

KEY	ITEM
1	Fixture
2	Gear (Keyboard Drive)
3	Back Plate Screw

5-9. BENCH TEST CABLE ASSEMBLIES, COMMERCIAL TYPE.

a. PRIMARY POWER BENCH TEST CABLE (See Figure 5-115). - The primary bench test cable, MITE Corporation part number 38557, is used to provide a connection to the 115 vac, 60 cycle, single phase primary power supply. This cable is connected to the right-rear chassis connector receptacle with a one-quarter clockwise turn.

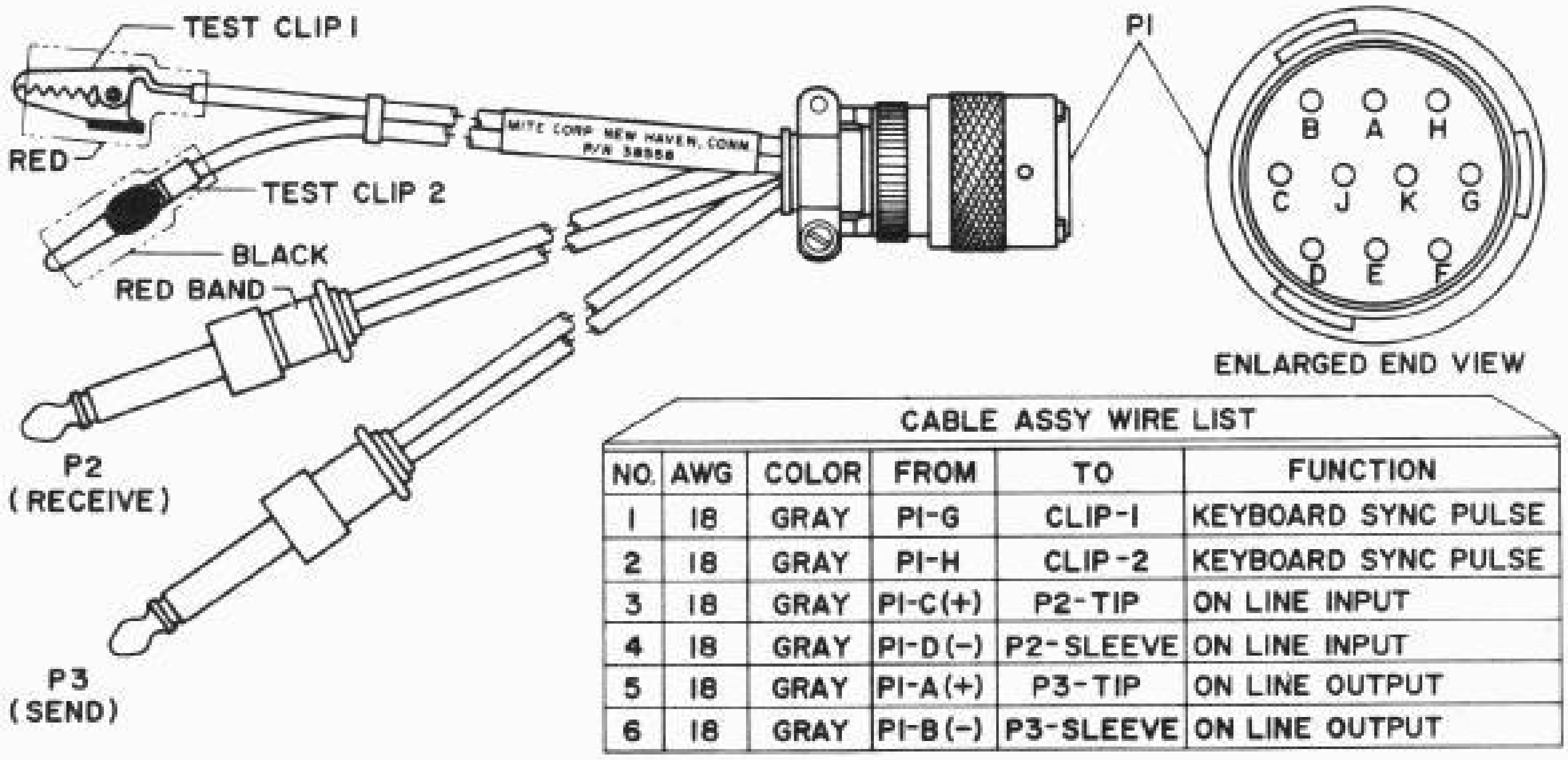
b. SIGNAL BENCH TEST CABLE (See Figure 5-116). - The signal bench test cable, MITE Corporation part number 38558, provides leads for connection of the unit to external generator, or monitoring teletypewriter and also provides leads for actuation of the keyboard interlock solenoid. This cable is connected to the left-rear chassis connector receptacle with a one-quarter clockwise turn.



CABLE ASSY. WIRE LIST

WIRE NO.	AWG	COLOR	TERMINATION A	TERMINATION B	FUNCTION
1	18	BLK ZIP CORD	P1-A	P2-A	115V AC 60~1PH (HOT)
2	18	BLK ZIP CORD CENTER CORD	P1-B	P2-B	SAFETY GROUND
3	18	BLK ZIP CORD	P1-C	P2-C	115V 60~1PH (SYSTEM GRD.)
4	———	———	P1-D	NO CONNECTION	SPARE
5	———	———	P1-E	NO CONNECTION	SPARE

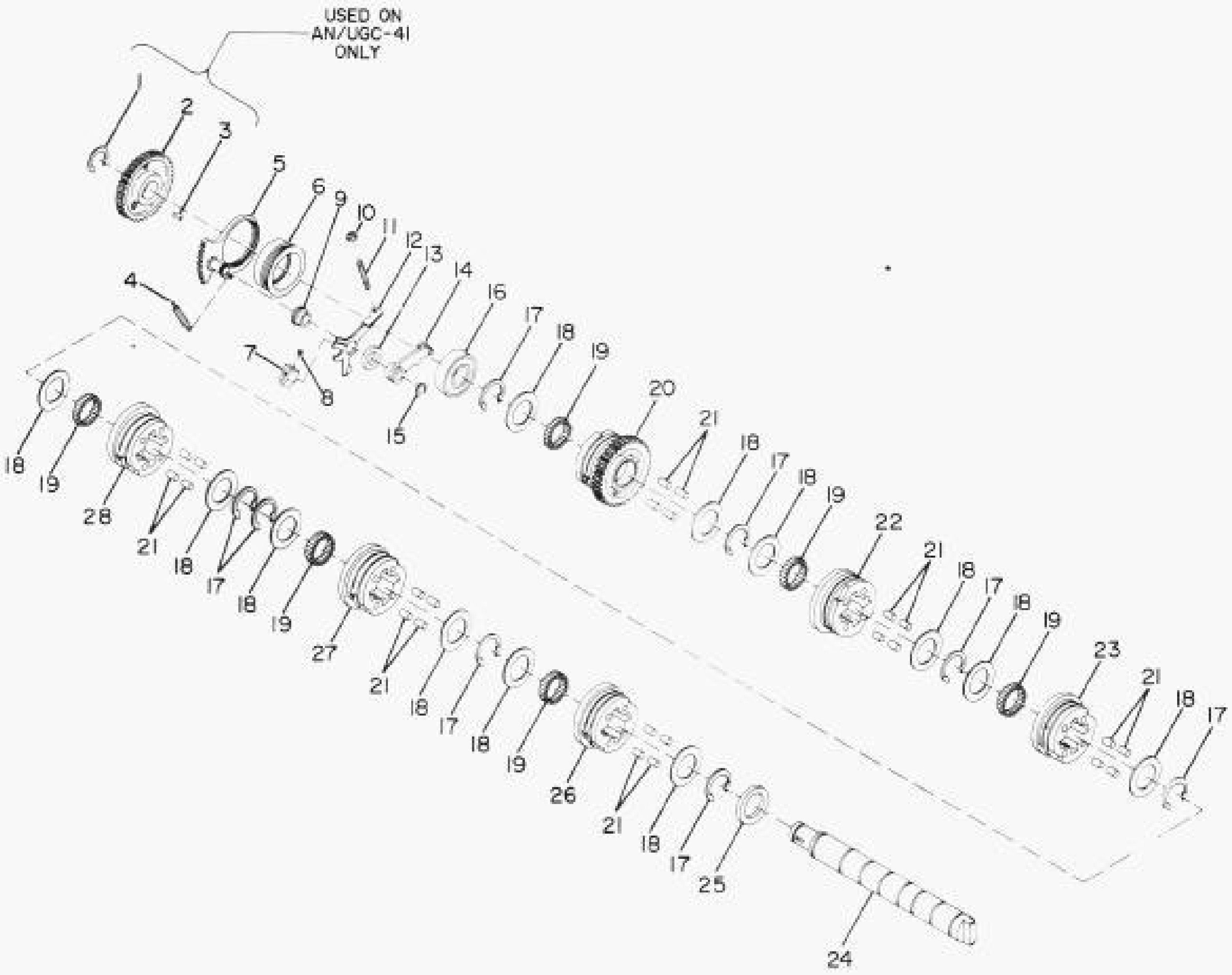
Figure 5-115. Primary Bench Test Cable



CABLE ASSY WIRE LIST

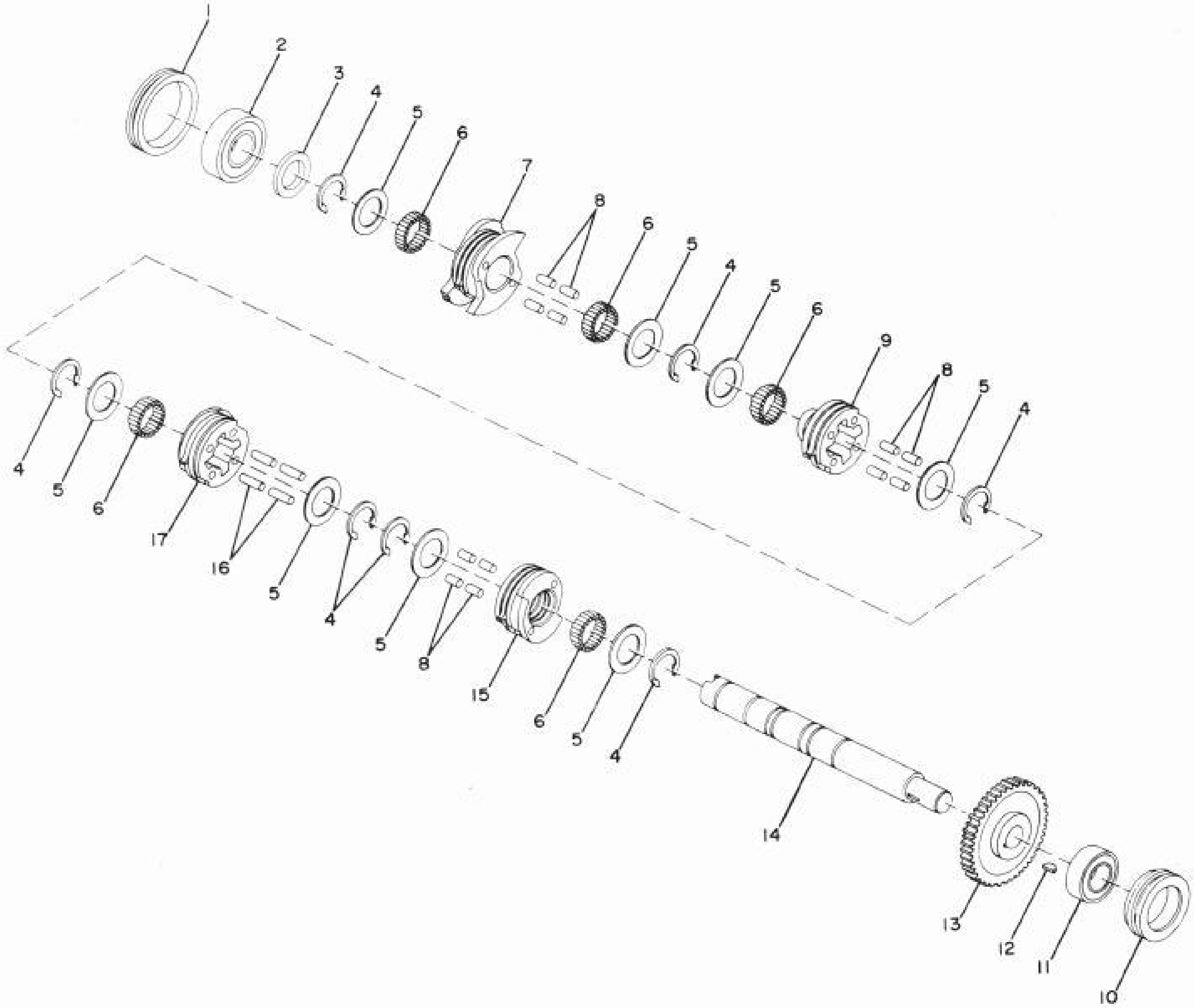
NO.	AWG	COLOR	FROM	TO	FUNCTION
1	18	GRAY	P1-G	CLIP-1	KEYBOARD SYNC PULSE
2	18	GRAY	P1-H	CLIP-2	KEYBOARD SYNC PULSE
3	18	GRAY	P1-C(+)	P2-TIP	ON LINE INPUT
4	18	GRAY	P1-D(−)	P2-SLEEVE	ON LINE INPUT
5	18	GRAY	P1-A(+)	P3-TIP	ON LINE OUTPUT
6	18	GRAY	P1-B(−)	P3-SLEEVE	ON LINE OUTPUT

Figure 5-116. Signal Bench Test Cable



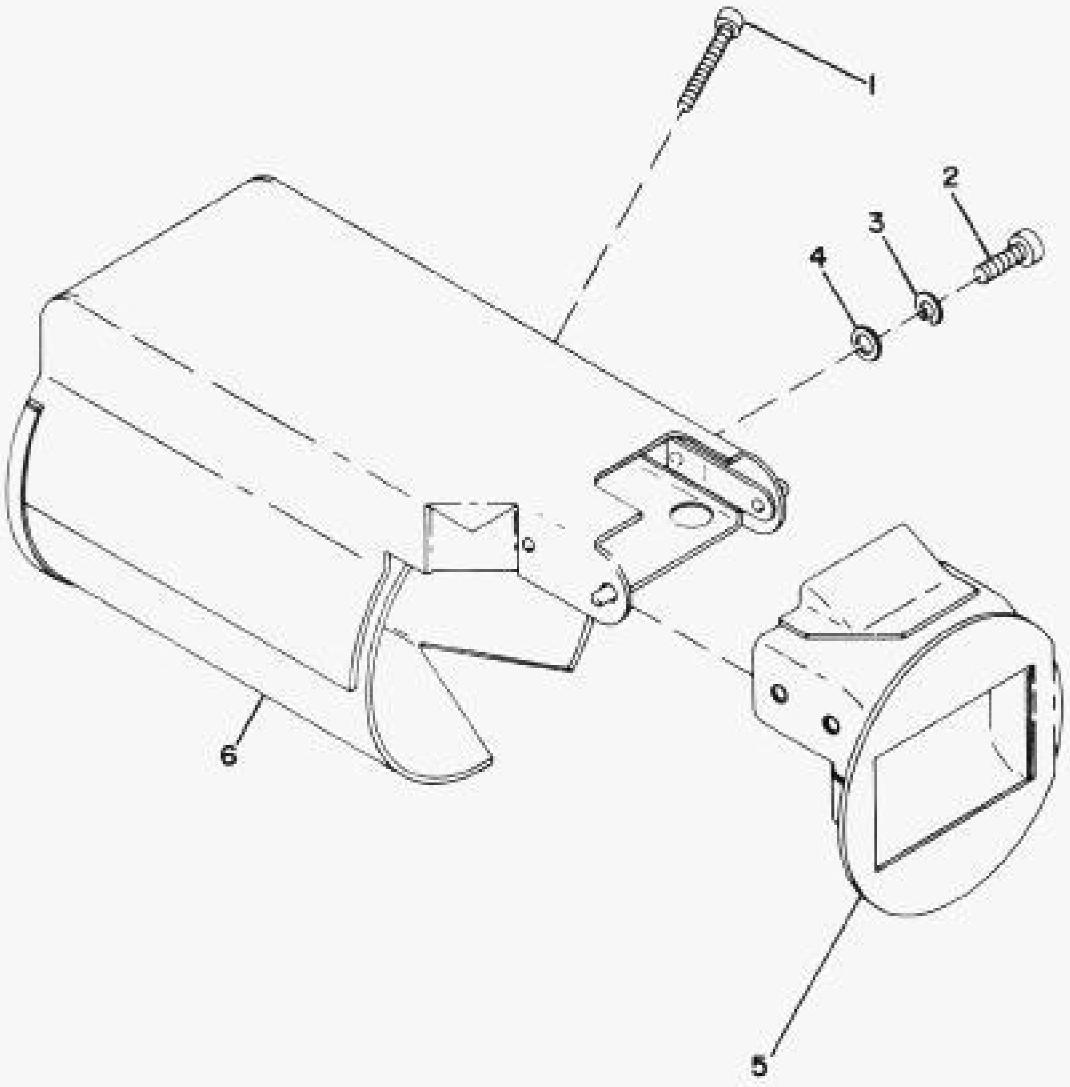
KEY	ITEM	KEY	ITEM
1	Ring, Retaining	15	Ring, Retaining
2	Gear, Printer Helical	16	Bearing, Left-Hand
3	Key, Woodruff	17	Ring, Retaining
4	Spring, Backstop Lever	18	Washer
5	Gear Segment, Range Adjustment Assembly	19	Roller, Needle Bearing
6	Retainer, Left-Hand Bearing	20	Clutch and A Cam, Start
7	Clamp	21	Roller
8	Screw, Clamp	22	Clutch and B Cam, No. Lateral
9	Eccentric Bushing, Start Clutch Backstop	23	Clutch and B Cam, No. 4 Lateral
10	Nut, Lock	24	Mainshaft, Selector
11	Setscrew, Start Clutch Release Adjustment	25	Spacer
12	Lever, Start Clutch Backstop	26	Clutch and F Cam, No. 1 Rotary
13	Washer, Felt	27	Clutch and E Cam, No. 2 Rotary
14	Latch	28	Clutch and D Cam, No. 5 Lateral

Figure 5-85. Selector Mainshaft Assembly



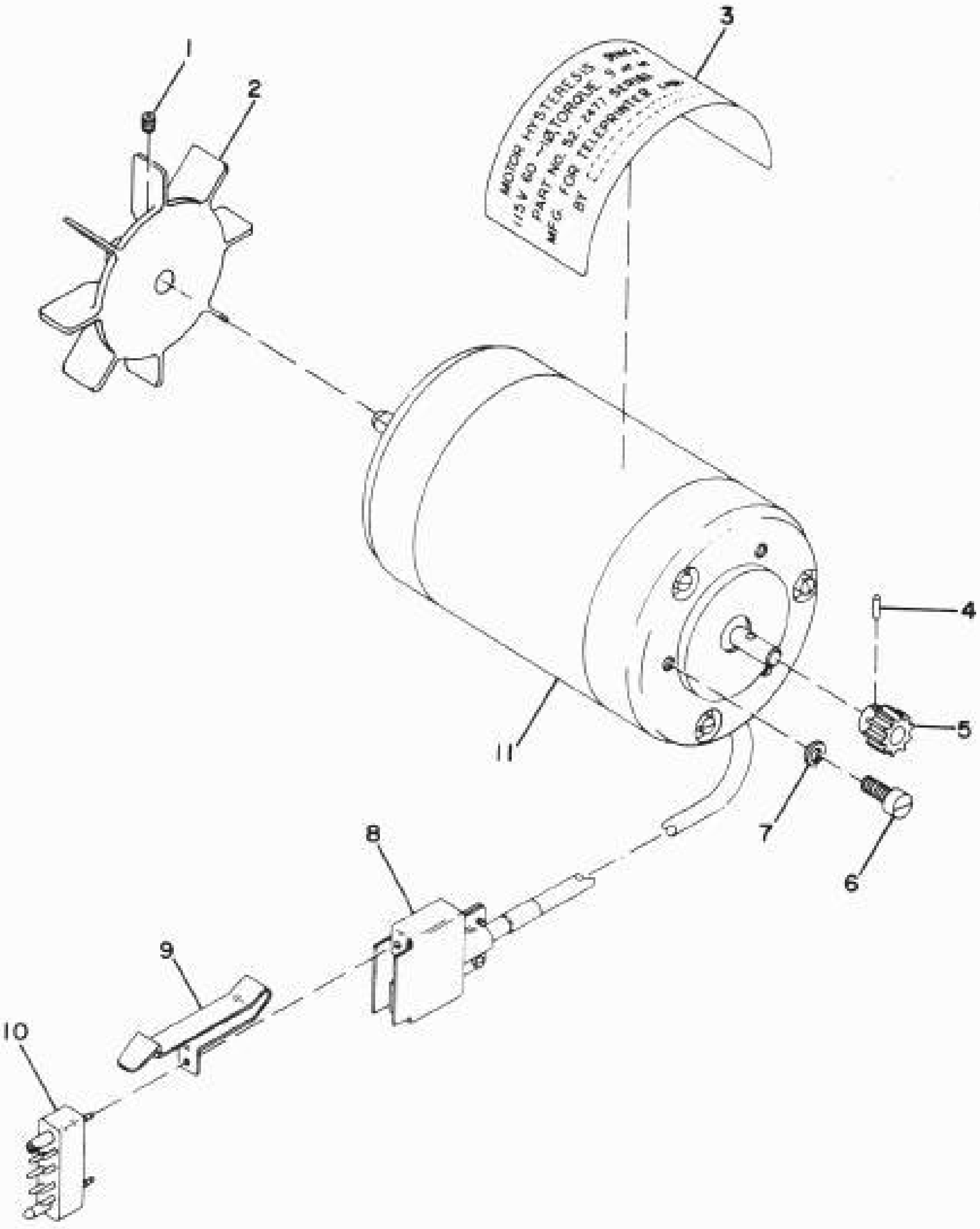
KEY	ITEM	KEY	ITEM
1	Retainer, Center Bearing	10	Bearing
2	Bearing, Center	11	Bearing, Right-Hand
3	Spacer	12	Gear Key, Third Reduction
4	Ring, Retaining	13	Gear, Third Reduction
5	Washer, Flat	14	Mainshaft, Function
6	Roller, Needle Bearing	15	Clutch, K Cam, Carriage Return
7	Clutch, G and H Cam, Print Function	16	Roller
8	Roller	17	Clutch, J Cam, Letter and Figures
9	Clutch, I Cam, Line Feed		

Figure 5-86. Function Mainshaft Assembly



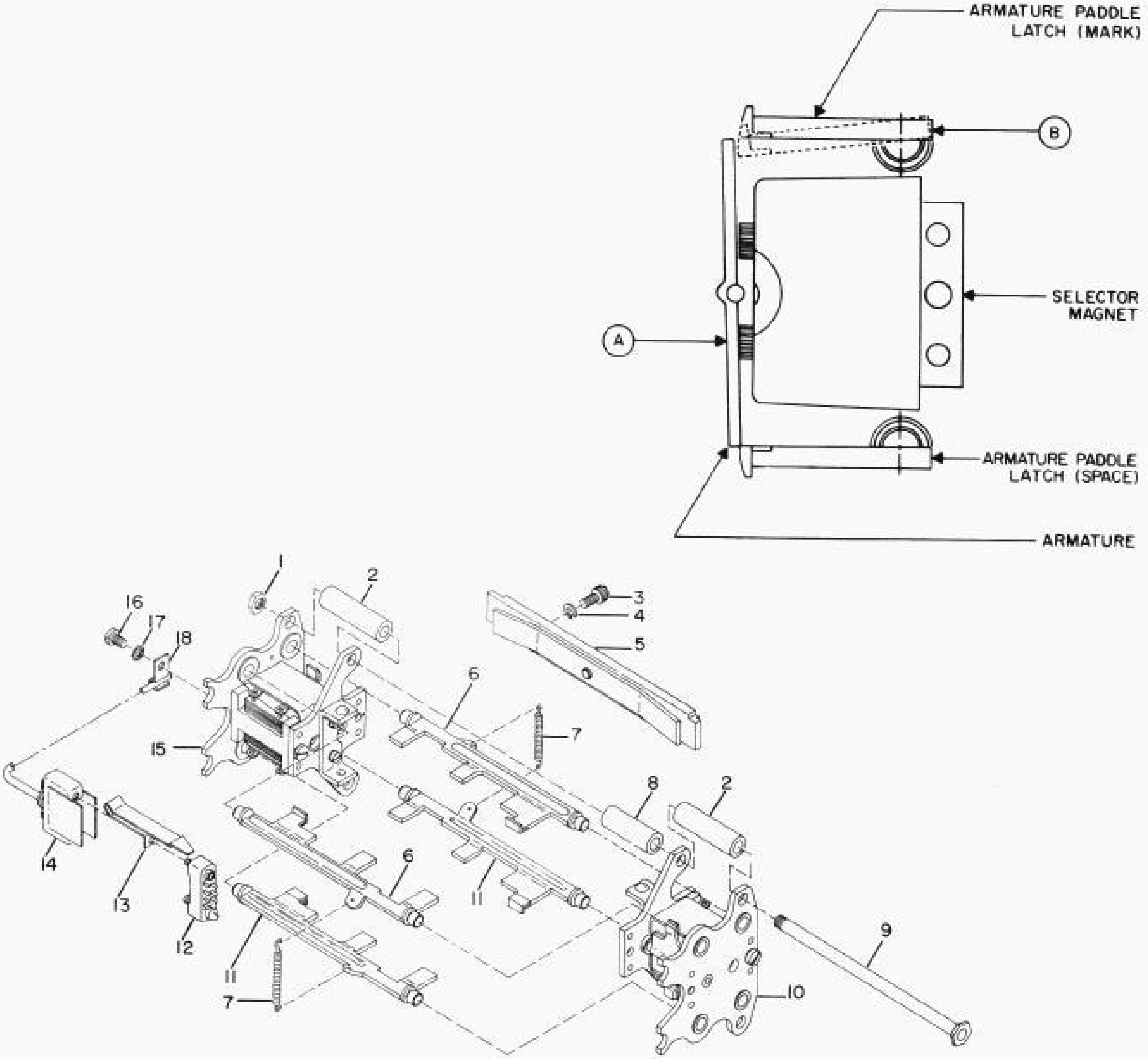
KEY	ITEM
1	Screw, Machine (Clamping)
2	Screw, Machine (Mounting)
3	Washer, Lock
4	Washer
5	Outlet, Cooling
6	Housing, Cooling

Figure 5-87. Fan Outlet Duct Assembly



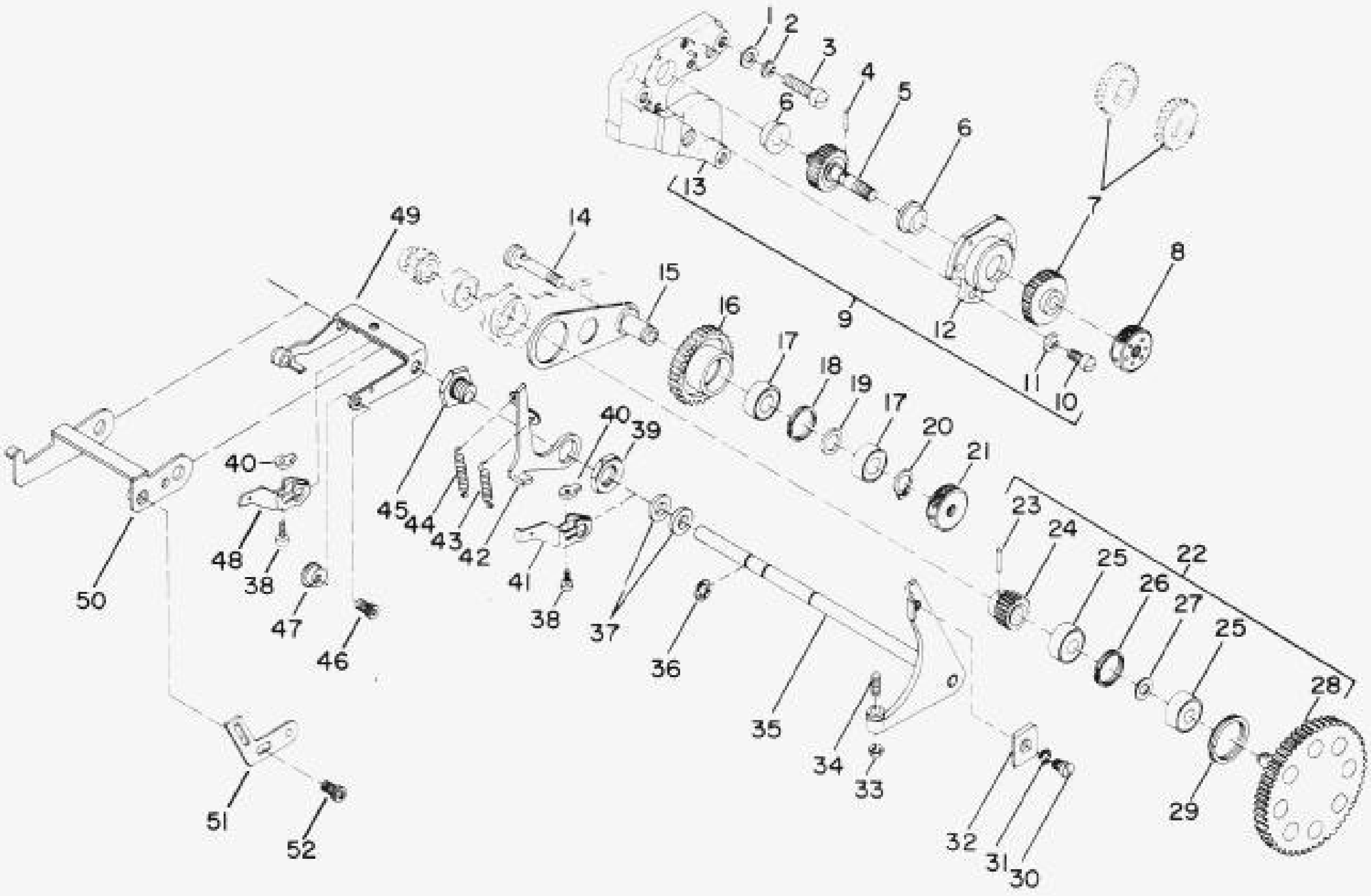
KEY	ITEM
1	Setscrew, Motor Fan
2	Fan, Motor
3	Motor, Decal
4	Pin, Gear
5	Gear, Pinion
6	Screw
7	Washer, Lock
8	Hood
9	Lock
10	Connector
11	Assembly, Motor

Figure 5-88. Motor (60 Cycle) and Gearhead Assembly



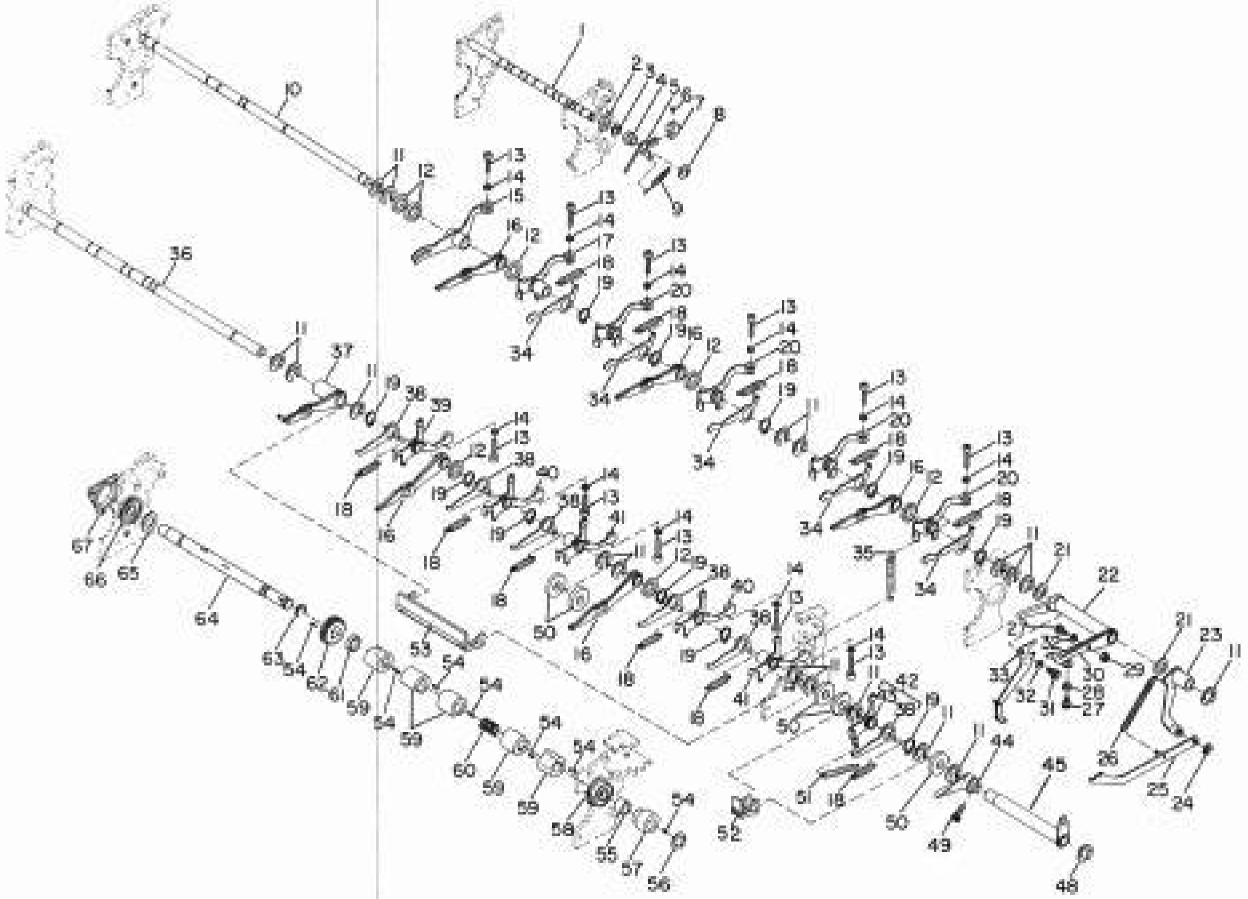
KEY	ITEM	KEY	ITEM
1	Nut	10	Frame Assembly, Right-Hand Magnet
2	Spacer, Outer Frame Plate	11	Shaft, Selector Space Latch
3	Screw	12	Connector
4	Washer	13	Lock
5	Bar	14	Hood
6	Shaft, Selector Mark Latch	15	Frame Assembly, Left-Hand Magnet
7	Spring, Selector Shaft Bias	16	Screw
8	Spacer, Inner Frame Plate	17	Washer, Lock
9	Stud, Selector Tie Rod	18	Bracket, Cable Strain Relief

Figure 5-89. Selector Assembly



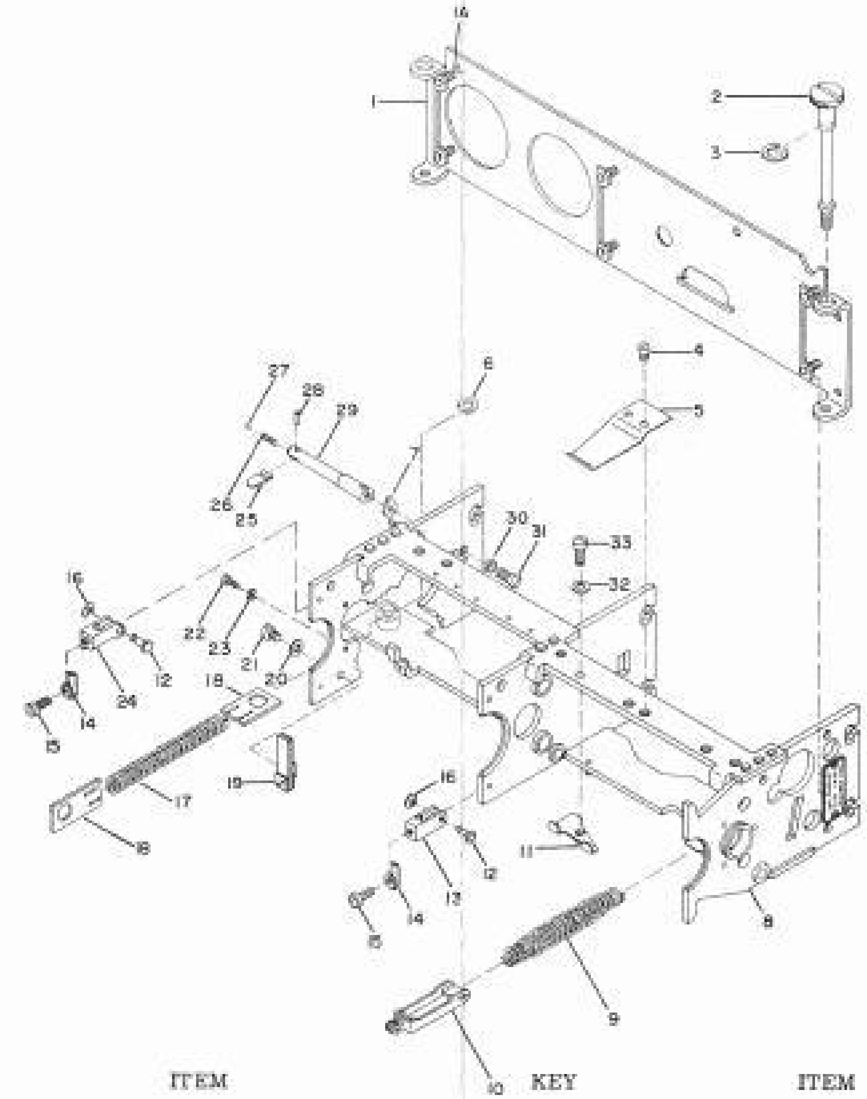
KEY	ITEM
1	Washer
2	Washer, Lock
3	Screw
4	Pin
5	Gear, First Reduction
6	Bearing
7	Gear, Speed Change
8	Lock Nut
9	Assembly, Motor Mount
10	Screw
11	Washer, Lock
12	Cup, Bearing
13	Plate, Motor Mounting
14	Stud
15	Assembly, Idler Gear Arm
16	Gear, Idler
17	Bearing
18	Ring
19	Spacer
20	Ring, Grip
21	Lock Nut
22	Pinion Assembly, Third Reduction
23	Pin
24	Pinion, Third Reduction
25	Bearing
26	Ring
27	Spacer
28	Gear, Second Reduction
29	Ring
30	Screw
31	Washer, Lock
32	Stop, 72 Character
33	Nut, Anti-Turn
34	Adjustment Screw, First Character
35	Shaft, V Lever
36	Ring (4), Retaining (Replaced by 3 clamps)
37	Washer, Felt
38	Screw
39	Nut, Plain Hex
40	Nut, Anti-Turn
41	Actuator Arm, Lock Lever
42	Lever, Lock
43	Helical Spring, Actuator Arm, Lock Lever
44	Helical Spring, Automatic Carriage Return and Line Feed
45	Bushing, Eccentric
46	Screw
47	Bail, Eccentric (Carriage Return)
48	Actuator, Automatic Carriage Return and Line Feed
49	Actuator, Line Feed and Carriage Return
50	Actuator (Blanks) AN/UGC-38 Only
51	Arm, Recognition AN/UGC-38 Only
52	Screw AN/UGC-38 Only

Figure 5-90. Gear Grain, Automatic Carriage Return, and Line Feed Assembly



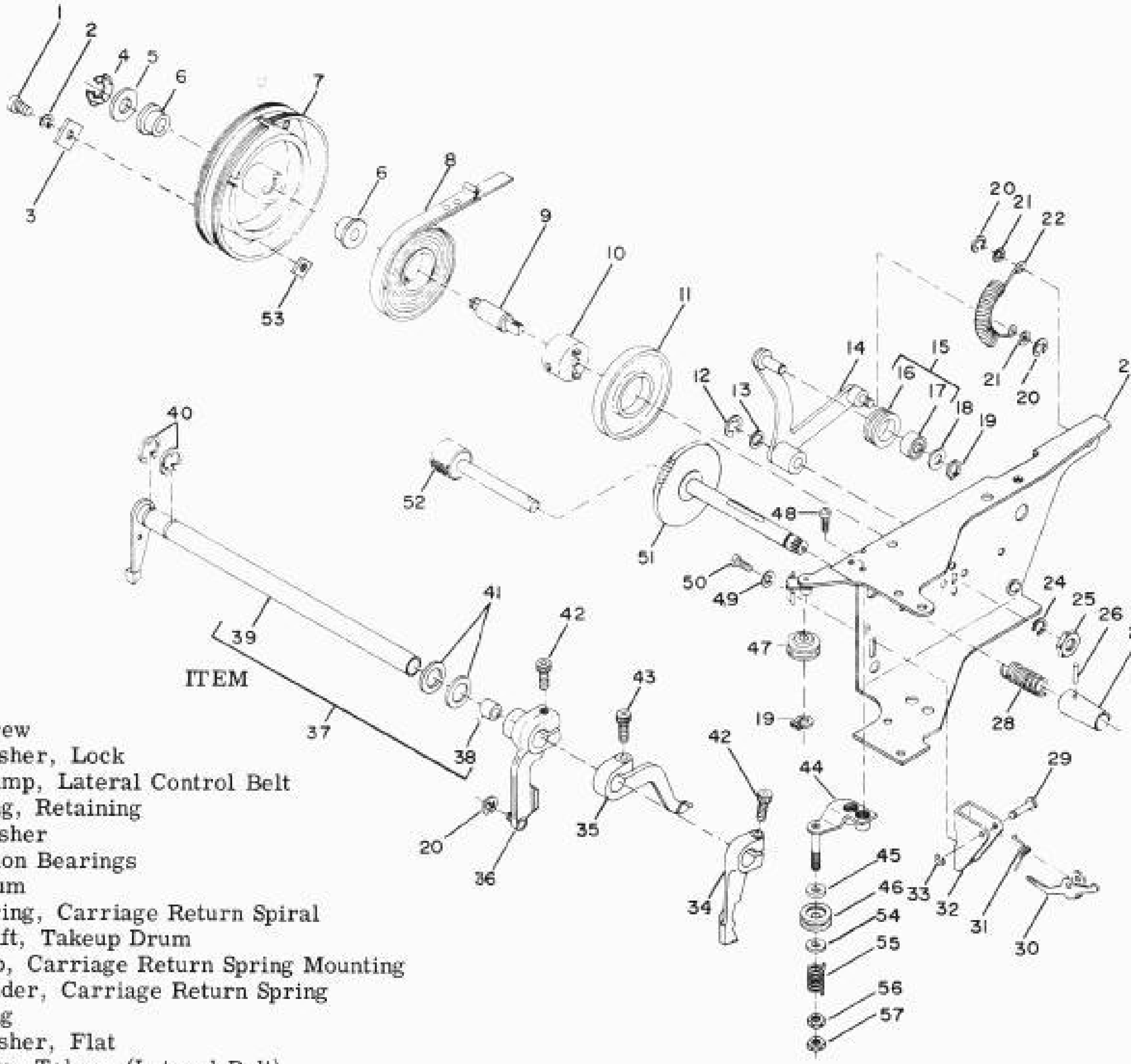
KEY	ITEM
1	Shaft, Backstop
2	Washer, Felt
3	Ring, Retaining
4	Bushing, Eccentric
5	Lever
6	Screw, Clamp
7	Clamp
8	Ring, Retaining
9	Spring, Clutch Backstop
10	Selector Shaft, Mark Clutch Release
11	Ring, Retaining
12	Washer, Felt
13	Adjustment Screw, Clutch Release Finger
14	Nut, Lock
15	Cam Follower Arm, Line Feed
16	Cam Follower, Type Positioning
17	Arm Assembly, Start Clutch Release
18	Spring, Safety
19	Ring, Retaining
20	Arm Assembly, Mark Clutch Release
21	Washer, Felt
22	Follower Assembly, Letters Figures Cam
23	Amplify Link, Line Feed Motion
24	Ring, Retaining
25	Pawl, Line Feed
26	Spring, Line Feed Pawl
27	Screw
28	Nut
29	Nut
30	Actuator, Pulley Carriage
31	Screw
32	Washer
33	Lever, Bell Prevent
34	Finger, Mark Clutch Release
35	Spring, Inter-Arm
36	Selector Shaft, Space Clutch Release
37	Cam Follower, No. 3 Secondary
38	Finger
39	Release Arm, No. 3 Space Clutch
40	Release Arm, No. 2 and 4 Space Clutch
41	Release Arm, No. 1 and 5 Space Clutch
42	Release Assembly, Print and Function Clutch
43	Release Arm, Print Function Clutch
44	Follower Arm, Line Feed Cam
45	Actuator, Line Feed Torque Tube
46	Deleted
47	Deleted
48	Ring, Retaining
49	Screw, Clamping
50	Washer, Felt
51	Spring, Print and Function Clutch Release Arm
52	Wick, Function Timing Cam
53	Wick, Timing Cam
54	Key
55	Spacer
56	Ring, Bowed Retaining
57	Cam, Function Clutch Release
58	Bearing
59	Cam, Timing
60	Spring
61	Spacer
62	Gear, Timing Cam Shaft
63	Ring, Retaining
64	Shaft, Timing Cam
65	Spacer
66	Bearing
67	Retainer, Bearing

Figure 5-91. Mark and Space Clutch Release Shaft, Timing Cam Shaft, and Backstop Shaft Assembly



KEY	ITEM
1	Plate, Back
1A	Screw, Backplate Clamp Retaining
2	Screw, Rear Lock
3	Ring, Retaining
4	Screw
5	Spring, Stop
6	Retaining, Ring
7	Positioning, Clip
8	Frame, Rear
9	Spring, Function Helical
10	Link Assembly, Print and Function Helical Spring Yoke
11	Clip, Backstop Spring
12	Pivot, Stud
13	Clamp, Frame
14	Pad
15	Screw
16	Ring, Retaining
17	Spring, Print Helical
18	Retainers, Print Spring
19	Wick Assembly, Start Cam Lubricating
20	Washer, Lock
21	Screw
22	Screw, Machine
23	Washer, Lock
24	Clamp, Frame (top)
25	Arm, Lock
26	Spring, Detent Helical
27	Ball, Detent
28	Pin
29	Post, Change Gear
30	Washer, Lock
31	Screw
32	Washer
33	Screw

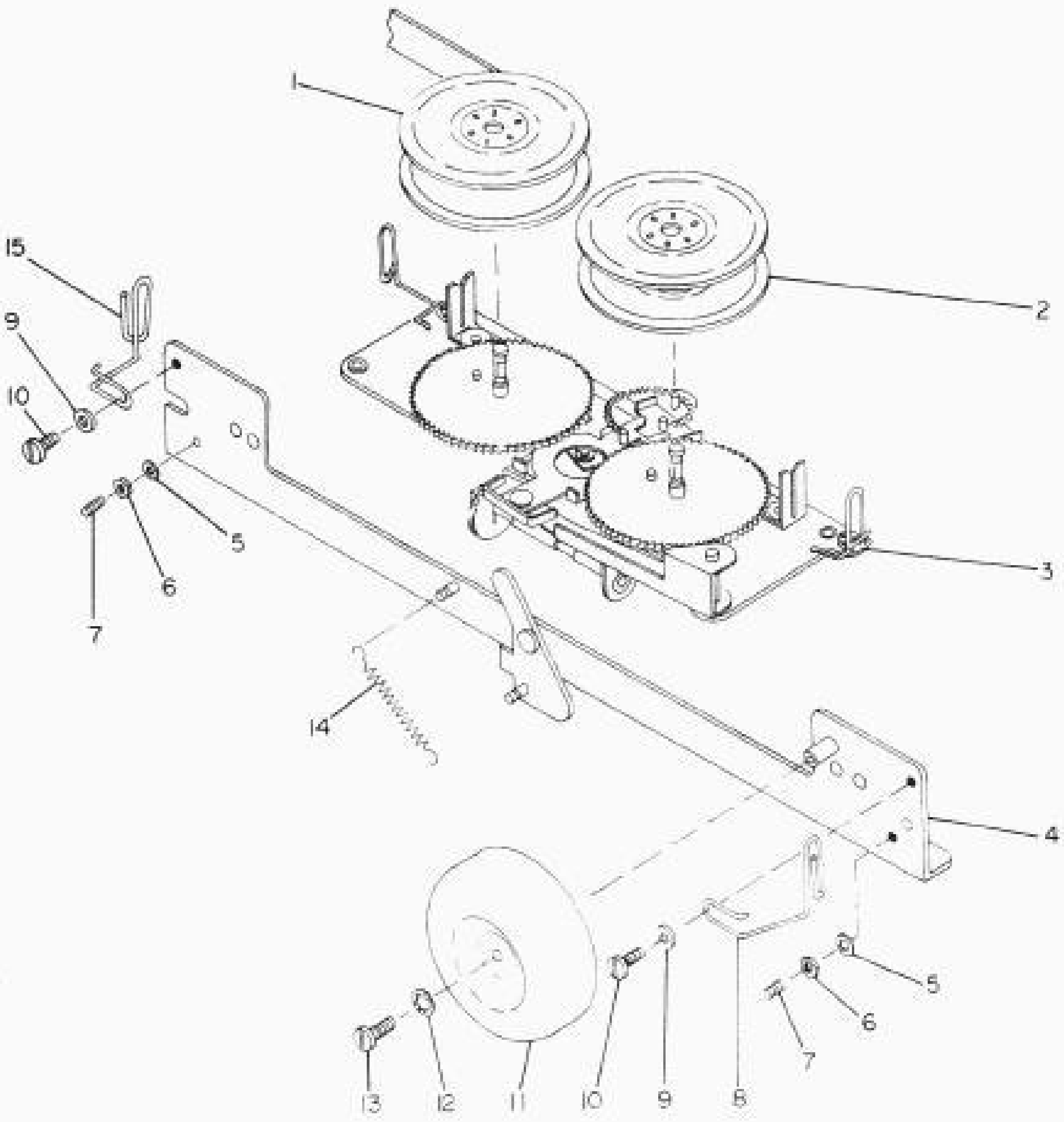
Figure 5-92. Rear Frame Assembly



KEY	ITEM
1	Screw
2	Washer, Lock
3	Clamp, Lateral Control Belt
4	Ring, Retaining
5	Washer
6	Nylon Bearings
7	Drum
8	Spring, Carriage Return Spiral
9	Shaft, Takeup Drum
10	Cup, Carriage Return Spring Mounting
11	Holder, Carriage Return Spring
12	Ring
13	Washer, Flat
14	Arm, Takeup (Lateral Belt)
15	Pulley Assembly Belt
16	Pulley
17	Bearing
18	Spacer
19	Ring
20	Ring, Retaining
21	Washer, Flat
22	Spring, Lateral Tension Helical
23	Bracket Assembly, Takeup Drum
24	Washer, Lock
25	Nut, Plain Hex
26	Pin Groove
27	Lock, Conical Range Finder Slide
28	Spring, Range Finder Lock Helical
29	Shaft
30	Lever
31	Spring
32	Bracket
33	Ring, Retaining
34	Arm, Print Prevent
35	Follower, Print Cam
36	Arm, Print Spring
37	Shaft Assembly Print Lever
38	Bearing
39	Shaft

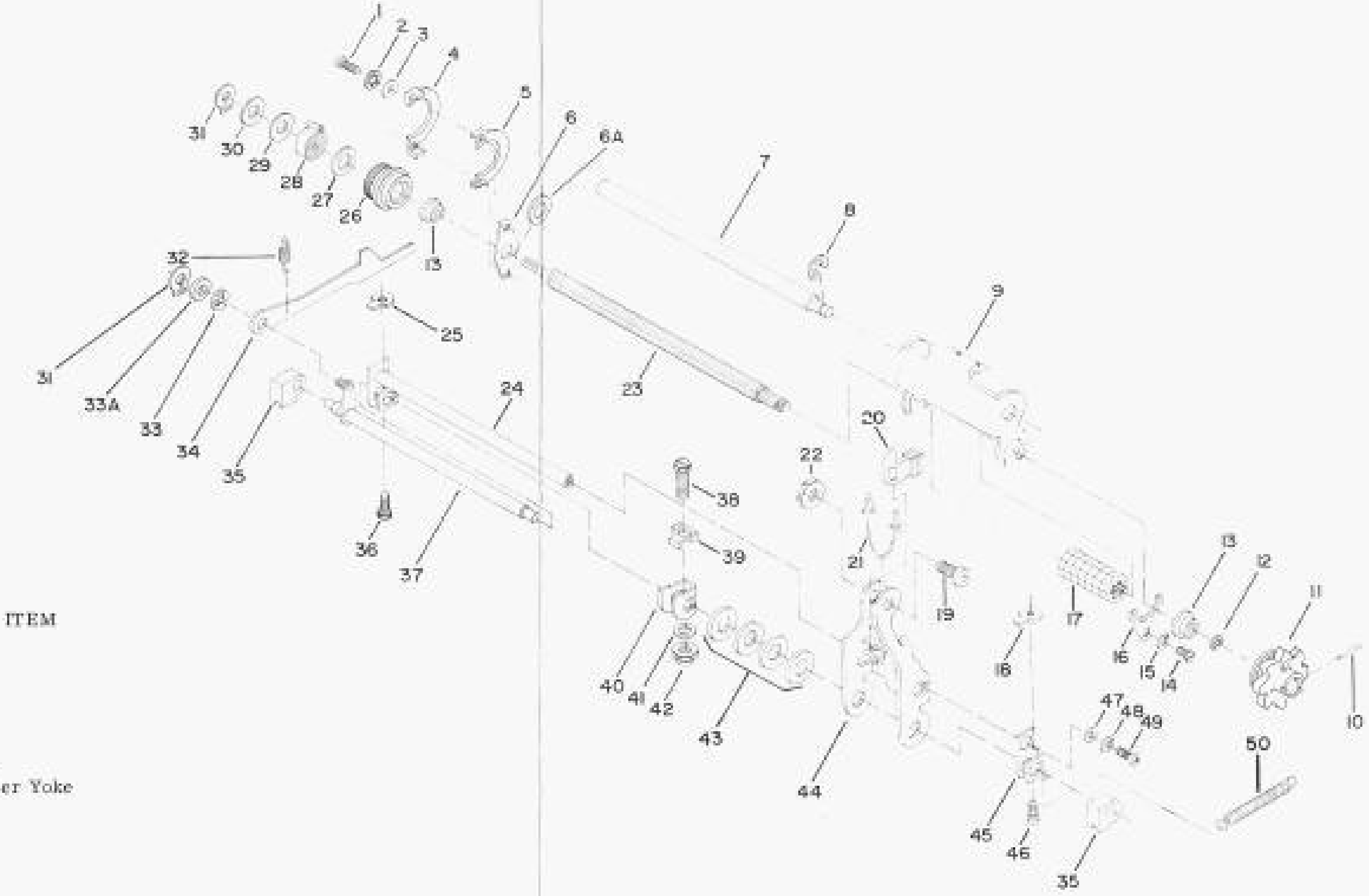
KEY	ITEM
40	Ring, Retaining
41	Washer, Felt
42	Screw, Clamping
43	Screw, Clamp
44	Bracket, Left-Hand Belt Pulley
45	Friction Washer
46	Belt Pulley
47	Pulley, Cable
48	Screw, Machine
49	Washer, Flat
50	Screw, Machine
51	Dial, Range
52	Knob, Range Finder
53	Nut, Clamp
54	Washer
55	Compression Spring
56	Hexnut
57	Hexnut

Figure 5-93. Takeup Drum and Linkage Assembly



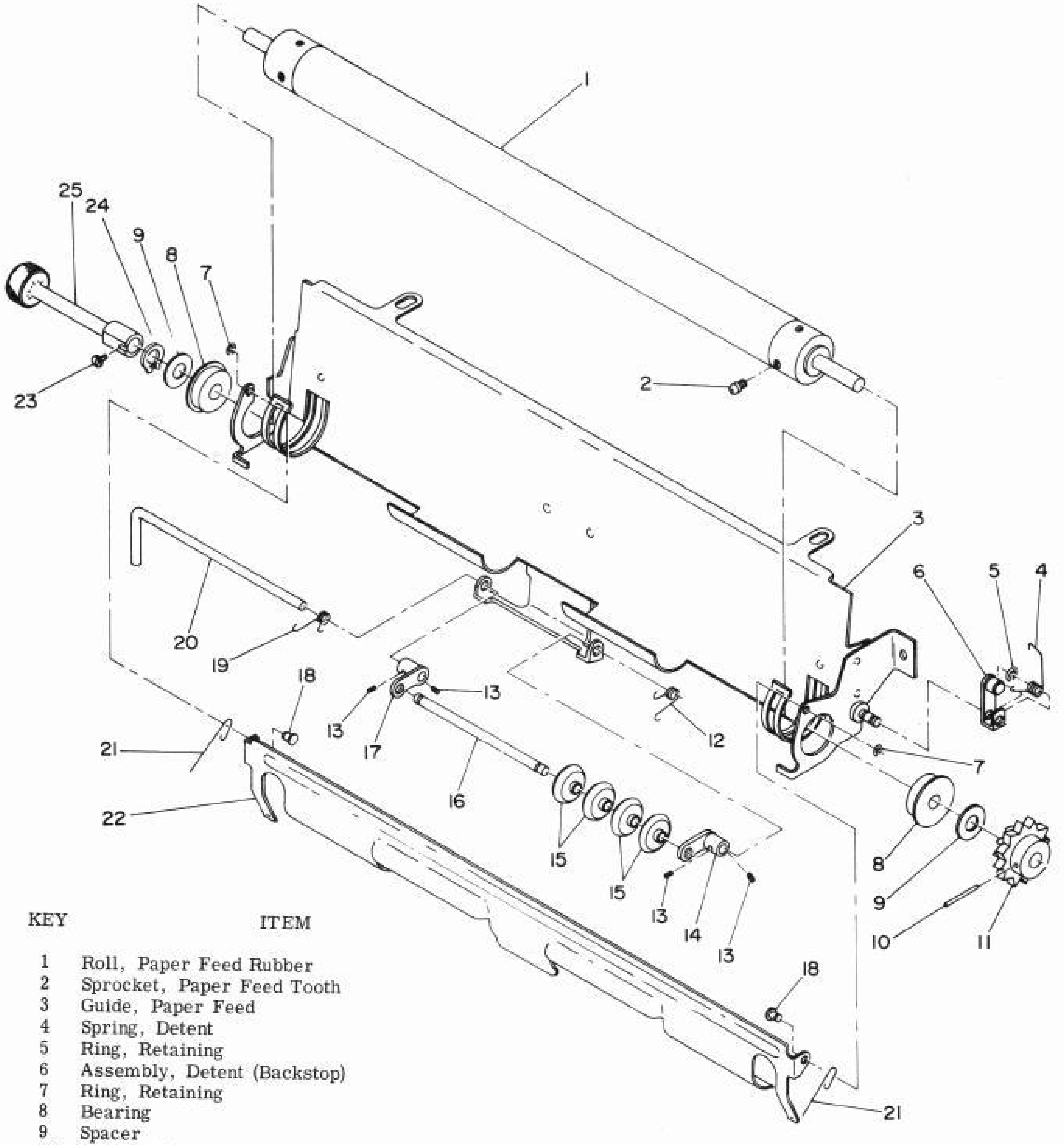
KEY	ITEM
1	Spool, Left Ribbon
2	Spool, Right Ribbon
3	Assembly, Ribbon Feed
4	Assembly, Front Plate
5	Washer, Lock
6	Nut
7	Setscrew
8	Guide, Right Ribbon
9	Washer
10	Screw
11	Bell
12	Washer, Lock
13	Screw
14	Spring
15	Guide, Left Ribbon

Figure 5-94. Ribbon Feed and Front Plate Assemblies



KEY	ITEM
1	Screw
2	Washer, Lock
3	Washer
4	Clamp, Upper
5	Clamp, Lower
6	Flange, Threading
7	Shaft, Print Cylinder Yoke
8	Ring, Retaining
9	Print Cylinder
10	Pin
11	Wheel, Index
12	Spacer
13	Bearing
14	Screw
15	Lockwasher
16	Retainer, Right-Hand Bearing
17	Print Cylinder
18	Nut, Anti-Turn
19	Screw
20	Face, Hammer
21	Guide, Ribbon
22	Nut
23	Shaft, Print Cylinder
24	Assembly, Bracket and Shaft
25	Nut, Anti-Turn
26	Retainer, Rotary Spring
27	Nylon Washer, Rotary Spring Housing
28	Spring, Rotary Motion
29	Nylon Washer, Rotary Motion Spring
30	Retaining Washer, Rotary Motion Spring
31	Ring, Grip
32	Spring, Print Hammer Actuator
33	Ring, Retaining
34	Link, Print Hammer Actuator
35	Bearing, Hammer Shaft
36	Screw
37	Assembly, Hammer Shaft
38	Screw
40	Stop, Hammer
41	Washer
42	Nut
43	Washers, Felt
44	Assembly, Hammer
45	Bracket, Right-Hand Hammer
46	Screw
47	Washer
48	Washer, Lock
49	Screw
50	Spring, Print Hammer Return

Figure 5-95. Print Hammer, Print Cylinder, and Print Cylinder Yoke Assembly



KEY	ITEM
1	Roll, Paper Feed Rubber
2	Sprocket, Paper Feed Tooth
3	Guide, Paper Feed
4	Spring, Detent
5	Ring, Retaining
6	Assembly, Detent (Backstop)
7	Ring, Retaining
8	Bearing
9	Spacer
10	Pin, Ratchet Roll
11	Detent and Ratchet Paper Feed
12	Spring, Right-Hand Pressure Roll
13	Setscrew
14	Arm, Right-Hand Pressure Roll
15	Roll, Pressure
16	Shaft, Pressure Roll Arm
17	Arm, Left Hand Pressure Roll
18	Pin, Pressure Pad Hinge
19	Spring, Left Hand Pressure Roll
20	Shaft, Release
21	Spring, Pressure Pad
22	Pad, Pressure
23	Screw
24	Ring, Retaining
25	Knob, Feed

Figure 5-96. Paper Feed Assembly

KEY	ITEM
1	Pin, Dowel
2	Rotary Pulley, Shim and Shaft
3	Pulley
4	Ring, Retaining
5	Bracket, Advance Drum
6	Bearing
7	Spacer, Sleeve
8	Ratchet Advance
9	Drum, Advance
10	Clamp, Cable
10A	Spacer
11	Ring, Retaining
11A	Washer, Lock
12	Screw, Cable Clamp
13	Washer
14	Spacer
15	Ring, Retaining
16	Screw, Clamping
17	Follower, Carriage Return Cam
18	Ring, Retaining
19	Washer, Felt
20	Bushing, Eccentric
21	Clamp
22	Setscrew
23	Lever, Bounce Prevent
24	Spring, Bounce Prevent Lever
25	Shaft Assembly, Carriage Return
26	Spring, Advance Prevent Lever
27	Spacer
28	Ring, Retaining
29	Link, Check Pawl
30	Screw
31	Bushing, Character Advance Pawl
32	Pawl, Character Advance
33	Strip, Felt
34	Clip, Felt Strip
35	Spring, Character Advance Pawl
36	Strip, Felt
37	Shim
38	Lever, Advance Prevent
39	Washer, Felt
40	Ring, Retaining
41	Ring, Retaining
42	Link, Index
43	Screw
44	Bushing, Rotary Detent Pawl Eccentric
45	Arm, Rotary Detent Actuator
46	Washer, Felt
47	Screw, Rotary Detent Pawl Adjustment
48	Nut, Plain Hex
49	Pawl
50	Washer
51	Spring, Rotary Detent Pawl
52	Shaft Assembly, Character Advance Lever
52A	Ring, Retaining
52B	Spacer
53	Arm, Lifter
54	Screw, Clamping
55	Spring, Lifter Arm
56	Lever Assembly Function
57	Spring, Check Pawl
58	Stud, Eccentric
59	Pawl, Check Assembly
60	Tip, Check Pawl
61	Washer
62	Washer Lock
63	Screw
64	Washer, Lock
65	Nut, Plain Hex
66	Screw
67	Bushing, Check Pawl
68	Spacer
69	Screw, Machine
70	Bushing, Advance Suppression Latch Eccentric
71	Latch, Advance Suppression Latch Eccentric
72	Washers, Felt
73	Stud, Advance Suppression Latch Mounting
74	Cable, Rotary
75	Ring, Grip
76	Pulley
77	Shaft Assembly
78	Bracket, Spacer
79	Pulley
80	Bracket, Lateral Control Belt Pulley
81	Stud, Function Spring Yoke Pivot
82	Screw, Special
83	Bar, Function
84	Spring, Function Lever Compression
85	Follower, Function Cam
86	Screw, Clamping
87	Bracket, Check Pawl Guide
88	Guide, Character Advance
88A	Washer
89	Screw
90	Cable, Return
91	Belt, Lateral Control
92	Cable Hammer

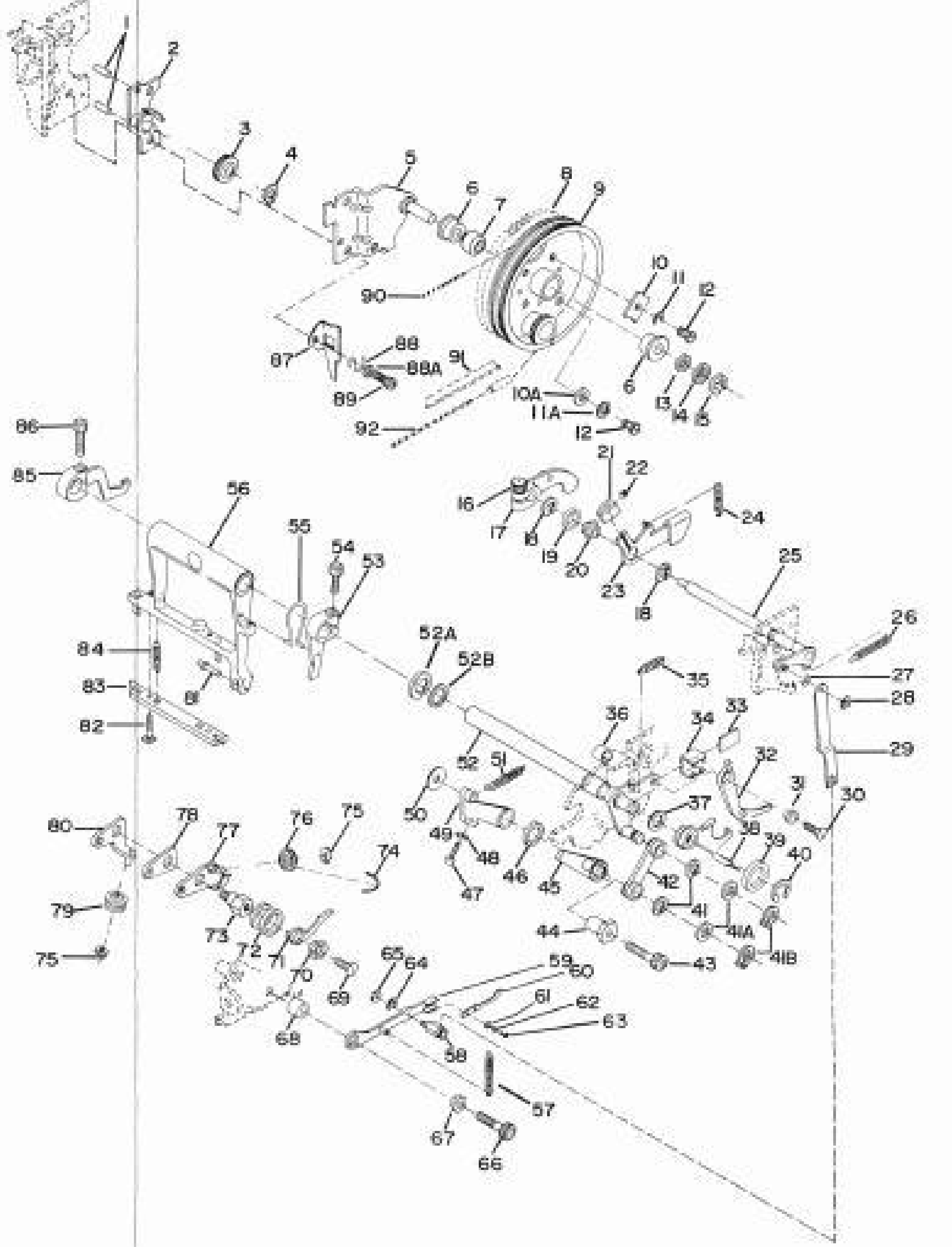


Figure 5-97. Advance Drum and Linkage Assembly

KEY	ITEM
1	Ring, Grip
2	Pulley
2A	Pulley (Black)
3	Guide, Bracket Print Hammer Actuator Link
4	Screw, Machine
5	Shaft, Print Hammer Release
6	Release, Print Hammer
7	Screw
8	Tab, Print Hammer Re
9	Screw
10	Nut, Lock
11	Pin, Paper Guide Retaining
12	Screw
13	Washer, Lock
14	Screw
15	Screw
16	Bracket
17	Pin
18	Ring, Retaining
19	Rod
20	Carriage, Pulley
21	Clip, Spring
22	Spacer, Sleeve
23	Ring, Retaining
24	Pin, Straight
25	Screw
26	Ring, Retaining
27	Clamp, Frame
28	Screw
29	Pad
30	Pivot, Clamp
31	Screw
32	Screw, Shift Lever Adjustment
33	Bracket, Shift
34	Shift, Line Feed
35	Arm Line Feed Shift
36	Ring, Retaining
37	Screw
38	Washer, Lock
39	Washer
40	Ring, Grip
41	Spacer
42	Pulley Assembly, Lateral Control Belt
43	Pulley
44	Bearing
45	Nut
46	Screw
47	Bracket Assembly, Print Shaft and Character Advance Lever Shaft Support
48	Locator, Printing Electrical Chassis
49	Screw
50	Nut, Self-Locking
51	Washer, Flat
52	Screw
53	Screw
54	Screw
55	Washer
56	Bracket, Lateral Positioning Belt Adjustment
57	Adjustment Screw, Lateral Positioning Belt
58	Hexnut
59	Yoke, Lateral Positioning Belt
60	Pin
61	Ring, Retaining
62	Lateral Positioning Belt
63	Washer, Lock
64	Washer
65	Post, Lateral Pulley
66	Ring, Retaining

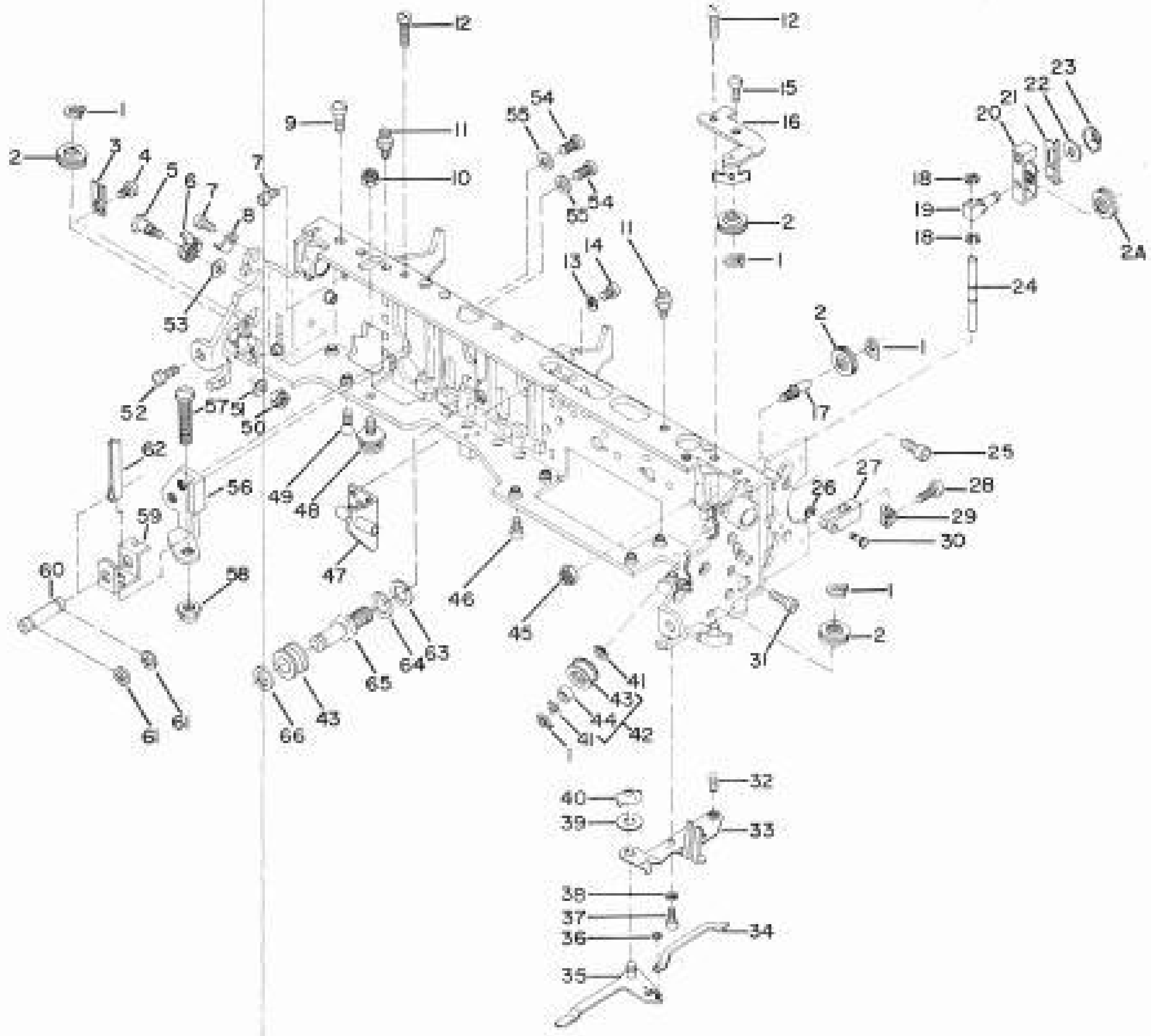
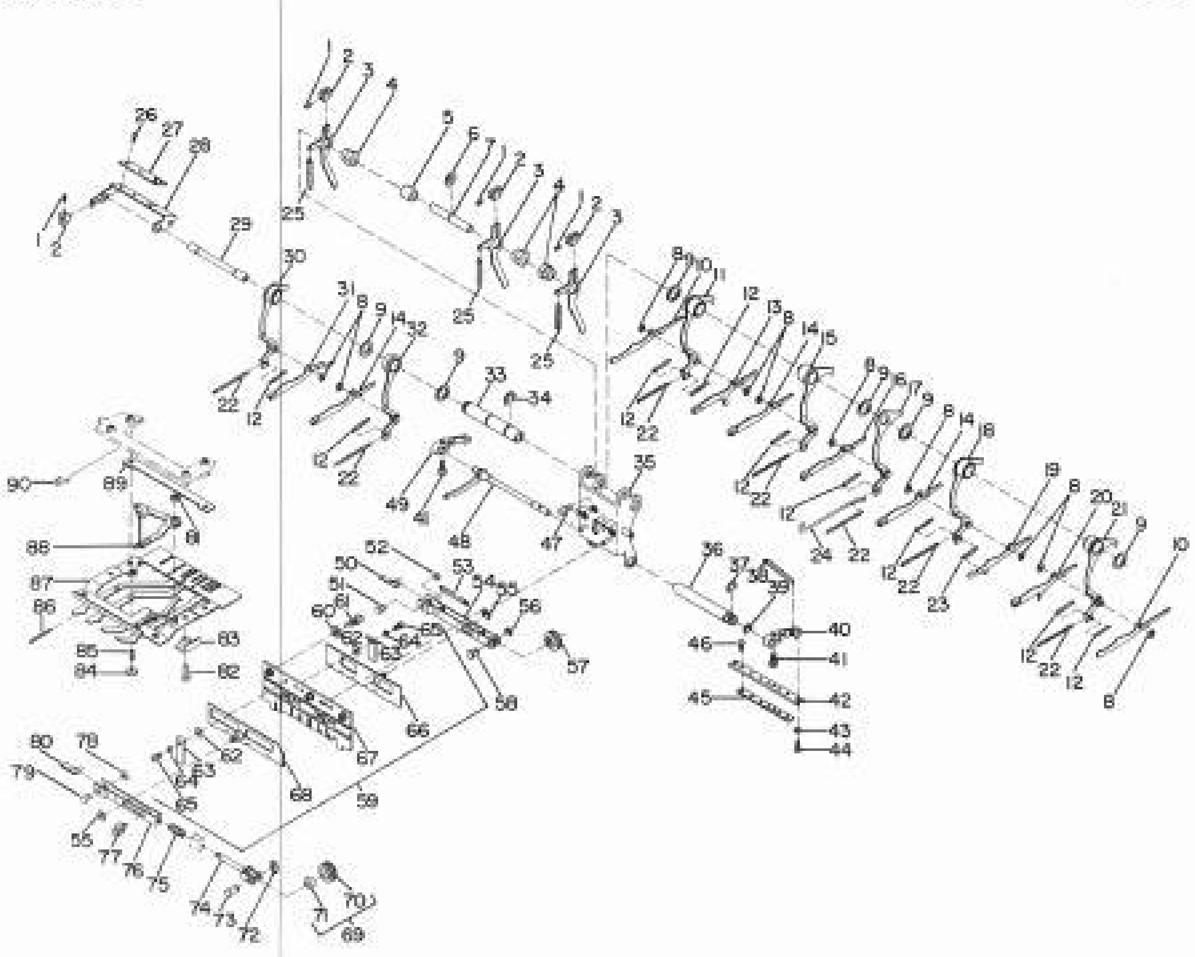


Figure 5-98. Front Frame Assembly (Front View)

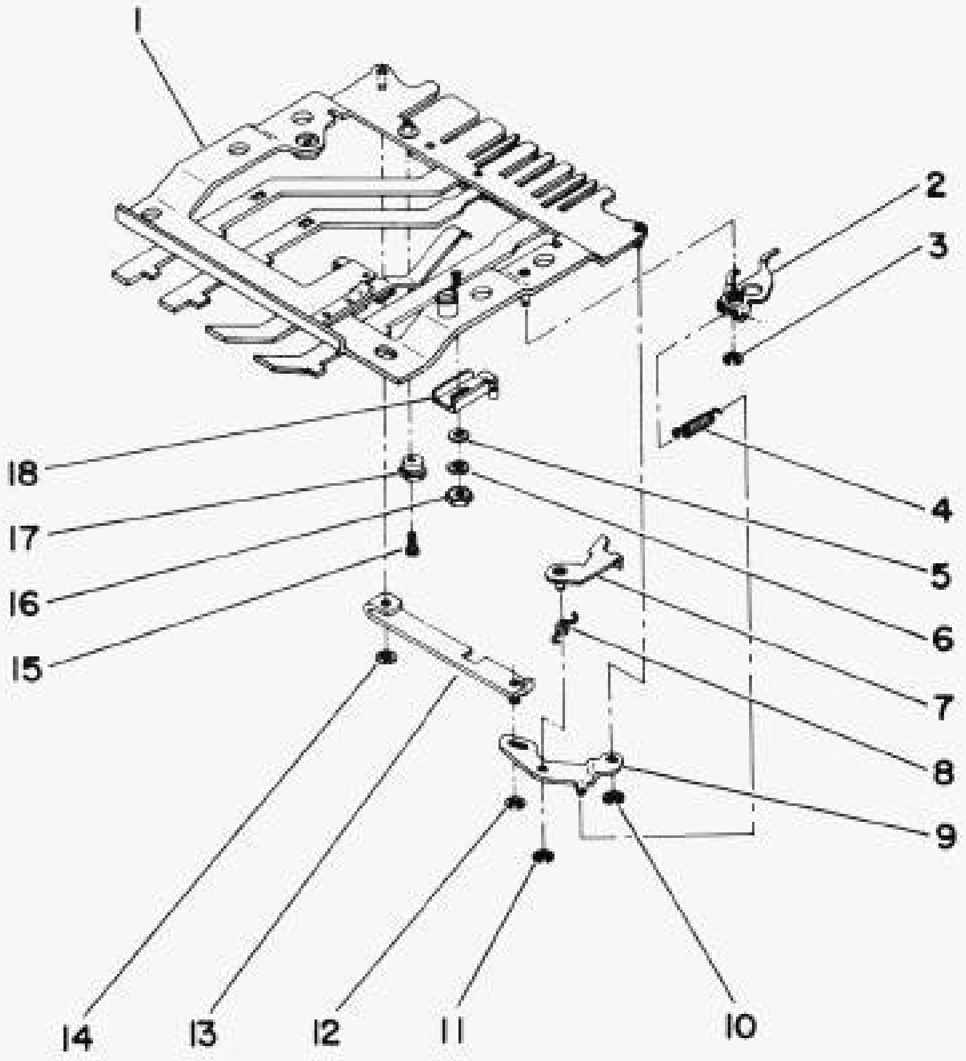


KEY	ITEM
1	Setscrew, Clamp
2	Clamp
3	Backstop, Function
4	Bushing, Function Backstop Eccentric
5	Spacer, Sleeve
6	Ring, Retaining
7	Shaft, Function Backstop
8	Ring, Retaining
9	Spacers
10	Lever, Carriage Return and Line Feed Sensing Finger
11	Arm, Line Feed Clutch Release
12	Spring, Function Sensing Finger Lever Helical
13	Lever, Off Line Line Feed Sensing Finger
14	Lever, Function Sensing Finger
15	Arm, Figures Clutch Release
16	Lever, Bell Actuator Sensing Finger
17	Arm, Bell Advance Suppression
18	Arm, Letters Clutch Release
19	Lever, Off Line Letters Sensing Finger
20	Lever, Off Line Carriage Return Sensing Finger
21	Arm, Carriage Return Clutch Release
22	Spring, Function Clutch Release Arm Return Helical
23	Spring, Off-Line Letters Sensing Finger Lever
24	Rod, Bell Actuator Connecting
25	Spring, Function Backstop
26	Screw, Function Advance Prevent Adjustment
27	Plate, Nylon Locking Bar
28	Bar
29	Shaft, Advance Prevent Bail Carriage Return Bar
30	Arm
31	Lever, Blank Sensing Finger
32	Arm, Space
33	Shaft, Function Clutch Release
34	Ring, Retaining
35	Frame Assembly, Function Clutch Release and Back-Stop
36	Shaft, Function Clutch Release Arm Stop
37	Ring, Retaining
38	Spring, Print Prevent Rod Actuator Arm Bias
39	Ring, Retaining
40	Arm, Right-Hand Print Prevent Rod Actuator
41	Screw, Print Prevent Rod Actuator Arm
42	Rod, Assembly
43	Washer, Flat
44	Screw

KEY	ITEM
45	Strip, Lock
46	Screw, Print Prevent Adjustment
47	Screw
48	Shaft Assembly, Print Prevent Rod Lever
49	Arm, Left-Hand Print Prevent Rod Actuator
50	Belt, Rotary Positioning
51	Pin, Rotary Positioning Belt
52	Ring, Retaining
53	Spring, Safety
54	Strip, Rotary
55	Ring, Retaining
56	Ring, Retaining
57	Pulley, Rotary Cable
58	Pin, Pulley
59	Slide Assembly, Function
60	Spacer
61	Screw
62	Spacer
63	Clip
64	Washer, Lock
65	Screw
66	Slide, Rotary Function
67	Support

KEY	ITEM
68	Slide, Lateral Function
69	Pulley Assembly, Lateral Control Belt
70	Pulley B
71	Bearing
72	Ring, Retaining
73	Pin
74	Fork
75	Spring, Slack Takeup
76	Strip, Lateral Control
77	Slide, Slack Takeup
78	Ring, Retaining
79	Pin, Lateral Positioning Belt
80	Belt, Lateral Positioning
81	Ring, Retaining
82	Screw
83	Plate, Retaining
84	Nut, Plain Hex
85	Setscrew, Print Prevent Stop Adjustment
86	Spring, Off-Line Function Return Helical
87	Slide Assembly
88	Lever Assembly, Bell
89	Strip, Function Sensing Finger Lever Stop
90	Spring, Clip

Figure 5-99. Function Selector Assembly



KEY	ITEM
1	Assembly, Off-Line Function Slide
2	Lever, Cancellation
3	Ring, Retaining
4	Spring, Cancellation
5	Washer
6	Washer, Lock
7	Latch
8	Spring, Latch
9	Lever, Carriage Return
10	Ring, Retaining
11	Ring, Retaining
12	Ring, Retaining
13	Lever, Line Feed
14	Ring, Retaining
15	Screw
16	Nut
17	Eccentric
18	Slide

Figure 5-100. Off-Line Function Slide Assembly

KEY	ITEM
1	Pin, No. 1 through 5 Carriage
2	Ring, Retaining
3	Ring, Retaining
4	Washer
5	Rod, Carriage Pulley (Lateral)
5A	Rod, Carriage Pulley (Lateral)
6	Carriage (Lateral)
7	Carriage (Rotary)
8	Clip, Carriage
9	Spacer, Sleeve
10	Ring, Retaining
11	Pulley
12	Lever
13	Spring
14	Spacer
15	Ring, Retaining
16	Screw (AN/UGC-41 Only)
17	Bushing (AN/UGC-41 Only)
18	Gear Assembly Keyboard Idler (AN/UGC-41 Only)
19	Spacer (AN/UGC-41 Only)
20	Plate Idler Gear (AN/UGC-41 Only)
21	Retaining Ring
22	Nut
23	Yoke, Rotary Positioning Belt
24	Retaining Ring
25	Pin
26	Spring, Secondary No. 3 Cam Follower
27	Adjustment Screw, Rotary Positioning Belt
28	Rotary Positioning Belt
29	Screw, Machine
30	Nut, Plain Hex
31	Washer, Lock
32	Screw, No. 1 through 5 Stroke Adjustment (No. 1 and 2 Rotary and No. 3, 4 and 5 Lateral)
33	Retaining Ring
34	Spacer
35	Belt Pulley
36	Spacer
37	Shaft
38	Screw, Letters Figures Cam Follower Stroke Adjustment
39	Lever, Line Feed Shift
40	Ring, Retaining
41	Block, Nylon Lock
42	Bracket, Rotary Cable Adjustment
43	Ring, Retaining
44	Pin, Straight
45	Screw, Rotary Cable Adjustment
46	Frame Assembly, Front
47	Locknut, Rotary Positioning Belt Adjustment Screw

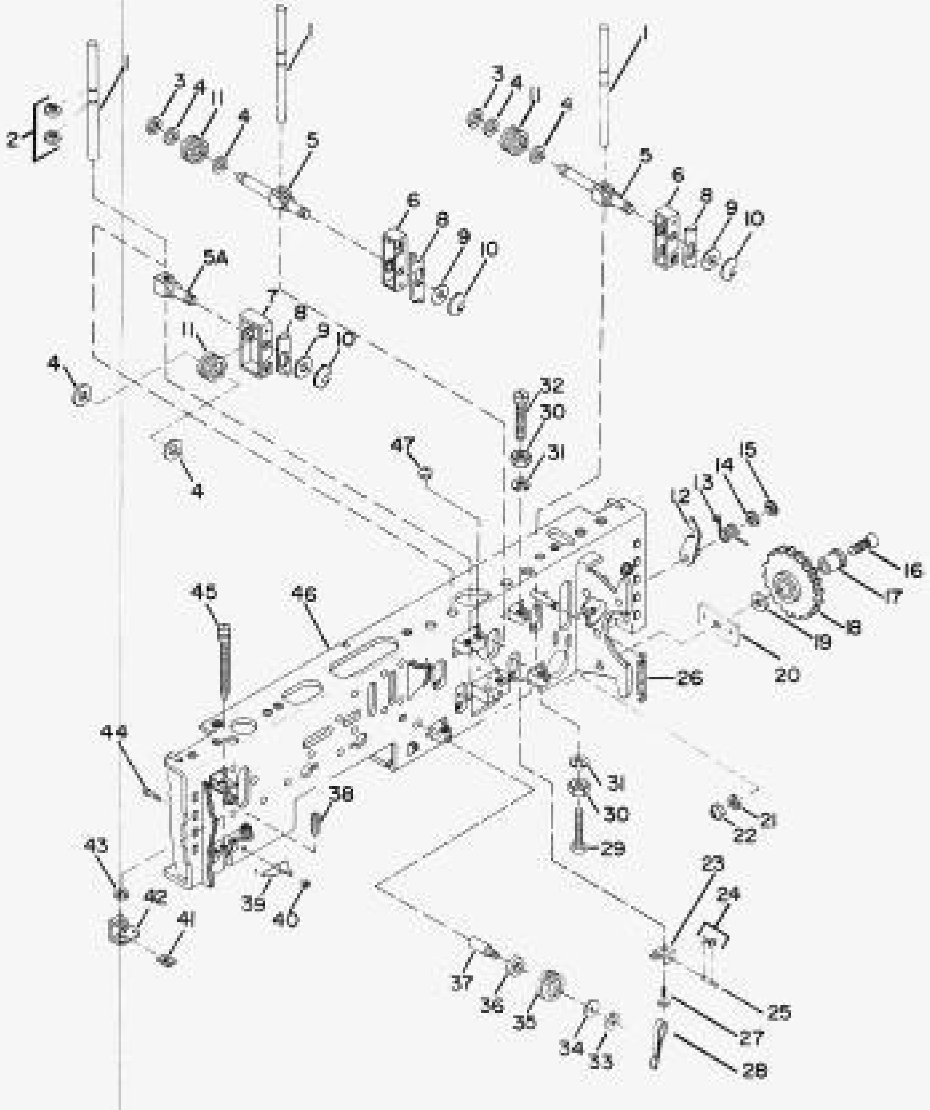


Figure 5-101. Front Frame Assembly (Rear View)

KEY	ITEM
1	Spindle, Left-Hand Ribbon Spool
2	Spindle, Right-Hand Ribbon Spool
3	Ring, Retaining
4	Assembly, Drive Pawl
5	Ring, Retaining
6	Spring, Drive Pawl
7	Spring, Check Pawl
8	Assembly, Check Pawl
9	Bar, Reverse
10	Washer
11	Washer
12	Spring, Power Lever
13	Ring, Retaining
14	Lever, Power
15	Washer, Spring
16	Screw, Pan Head
17	Washer
18	Guide, Right-Hand Ribbon
19	Washer
20	Pin, Cotter
21	Screw, Pan Head
22	Assembly, Bracket
23	Cam
24	Pin, Roll
25	Assembly, Gear Shaft
26	Gear, Ribbon Drive
27	Assembly, Plate
28	Guide, Left-Hand Ribbon
29	Clip, Spool

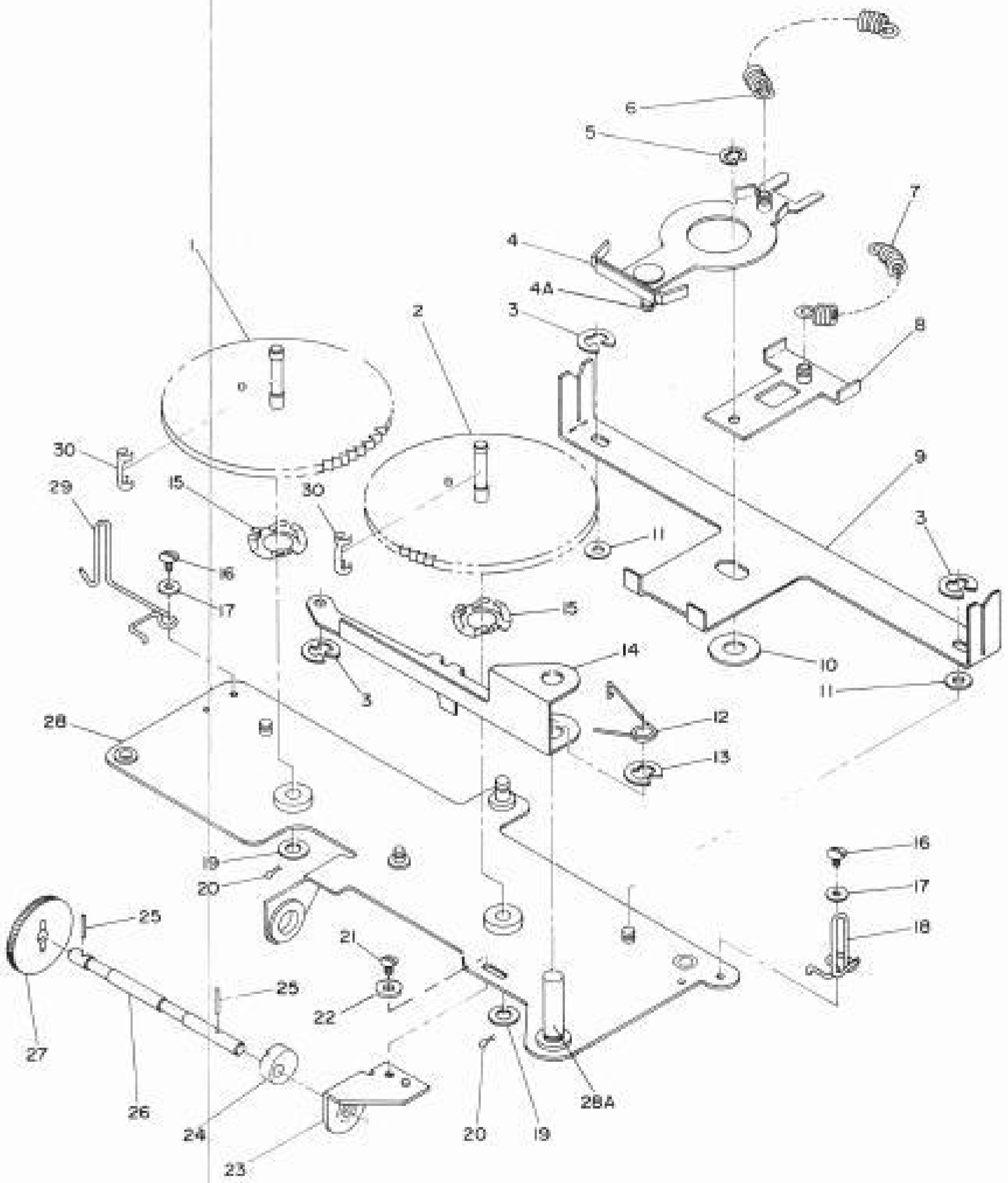


Figure 5-102. Ribbon Feed Assembly

KEY	ITEM
1	Rail, Keyboard Left-Hand
2	Screw, Machine
3	Screw, Machine
4	Washer, Lock
5	Rail, Keyboard Right-Hand
6	Screw Machine
7	Washer, Lock
8	Rollers, Code Bar
9	Spacer
10	Pin (counter sunk head)
11	Nut
12	Assembly, Keyboard Cover
13	Screw, Machine
14	Pad, Keyboard Cover
15	Plate Designation
16	Cover
17	Cover, Right Side
18	Screw, Machine
19	Washer, Lock
20	Assembly, Keyboard Guard
21	Spring
22	Screw, Machine
23	Screw, Machine
24	Spring
25	Stop, Repeat Key
26	Screw, Machine
27	Assembly, Repeat Key
28	Screw, Machine
29	Top, Repeat Key
30	Lever, Repeat Key
31	Strip, Key Retaining
32	Screw, Machine
33	Washer, Lock
34	Lever, Space Bar
35	Washer, Lock
36	Nut Hex
37	Shaft Assembly, Space Bar
38	Lever, Space Bar
39	Shaft, Space Bar
40	Nut, Hex
41	Washer, Lock
42	Bar, Space
43	Guide, Front Key
44	Screw, Machine
45	Assemblies, Key
46	Key Top, Figs
47	Key Top, Z
48	Key Top, X
49	Key Top, C
50	Key Top, V
51	Key Top, B
52	Key Top, N
53	Key Top, M
54	Key Top, LTRS
55	Key Top, Line Feed
56	Key Top, Blank
57	Bottom Row, Key Lever
58	Assembly, Bottom
59	Key Top, A
60	Key Top, Bell S
61	Key Top, D
62	Key Top, F
63	Key Top, G

KEY	ITEM
64	Key Top, H
65	Key Top, J
66	Key Top, K
67	Key Top, L
68	Key Top, CARRET
69	Middle Row, Key Lever
70	Key Top, I, Q
71	Key Top, 2W
72	Key Top, 3E
73	Key Top, 4R
74	Key Top, 5T
75	Key Top, 6Y
76	Key Top, 7U
77	Key Top, 8I
78	Key Top, 9O
79	Key Top, P0
80	Assembly, Key Lever
81	Top Tow, Key Lever
82	Seal, Key Lever
83	Pad, Wear
84	Contact Assembly Master Pulsing
85	Contact Assembly, Slip Connector
86	Screw Machine
87	Contact Assembly, Code Pulsing (Readout)
88	Screw Machine
89	Washer, Lock
90	Terminal Lug
91	Washer Flat
92	Screw Machine
93	Washer, Lock
94	Spring, Backstop
95	Wire, Shielded
96	Assembly, Cam
112	Spring, Master Pulsing Cam Follower
113	Spring, Code Pulsing Fingers
114	Assembly, Code Pulsing Finger
115	Shaft Clamp
116	Shaft Clamp
117	Shim Clamp
118	Screw, Machine
119	Lock, Washer
156	Bushing
157	Bar, No. 1 Code
158	Bar, No. 2 Code
159	Bar, No. 3 Code
160	Bar, No. 4 Code
161	Bar, No. 5 Code
162	Lever, Link
163	Ring, Retaining
164	Deleted
165	Assembly, Lever
166	Ring, Retaining
167	Spring, Clutch Release
168	Assembly, Clutch Release
169	Release, Cam Follower Clutch Release
170	Eccentric, Cam Follower Clutch Release
171	Locknut
172	Washer, Flat
173	Washer, Felt
174	Bail, Clutch Release
175	Ring, Retaining
176	Washer, Felt
177	Shaft, Bail Support

KEY	ITEM
178	Setscrew, Bail Support Shaft
179	Assembly, Repeat Arm
180	Actuate Arm, Repeat
181	Screw, Machine
182	Anti-Turn Nut
183	Finger
184	Assembly, Lever
185	Spring, Clutch Release
186	Filter
187	Screw, Machine
188	Hex Nut
189	Washer, Lock
190	Lug, Terminal
191	Switch, Send Rec-Rec Toggle
192	Switch, Break Pushbutton
193	Hex Nut
194	Bracket, Switch
195	Screw, Machine
196	Washer, Lock
197	Assembly, Clamp Nut
198	Assembly, Repeat Clamp
199	Screw, Machine
200	Anti-Turn Nut
201	Shaft, Repeat Key
202	Ring, Retaining
203	Ring, Retaining
204	Bushing
205	Assembly, Solenoid and Bracket
221	Stop, Solenoid
222	Screw, Machine
223	Anti-Turn Nut
224	Stop
225	Assembly, Code Bar
226	Screw, Code Bar Assembly
227	Washer, Lock
228	Guide, Key
229	Screw, Machine
230	Washer, Lock
231	Guide, Code Bar
232	Washer, Lock
233	Screw, Machine
234	Guide, Top Right Code Bar
235	Assembly, Frame

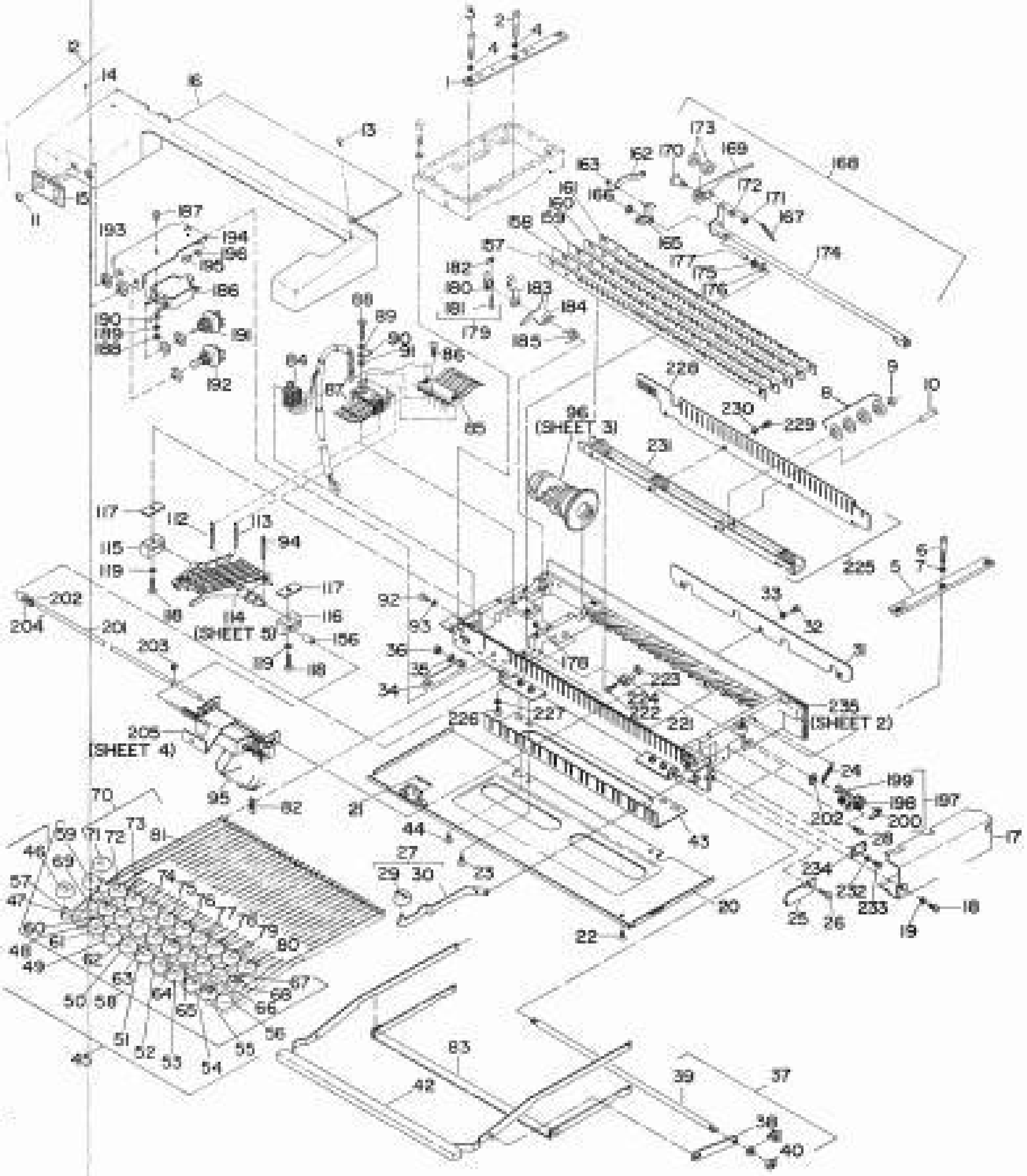


Figure 5-103. Keyboard Frame Assembly (Sheet 1 of 5)

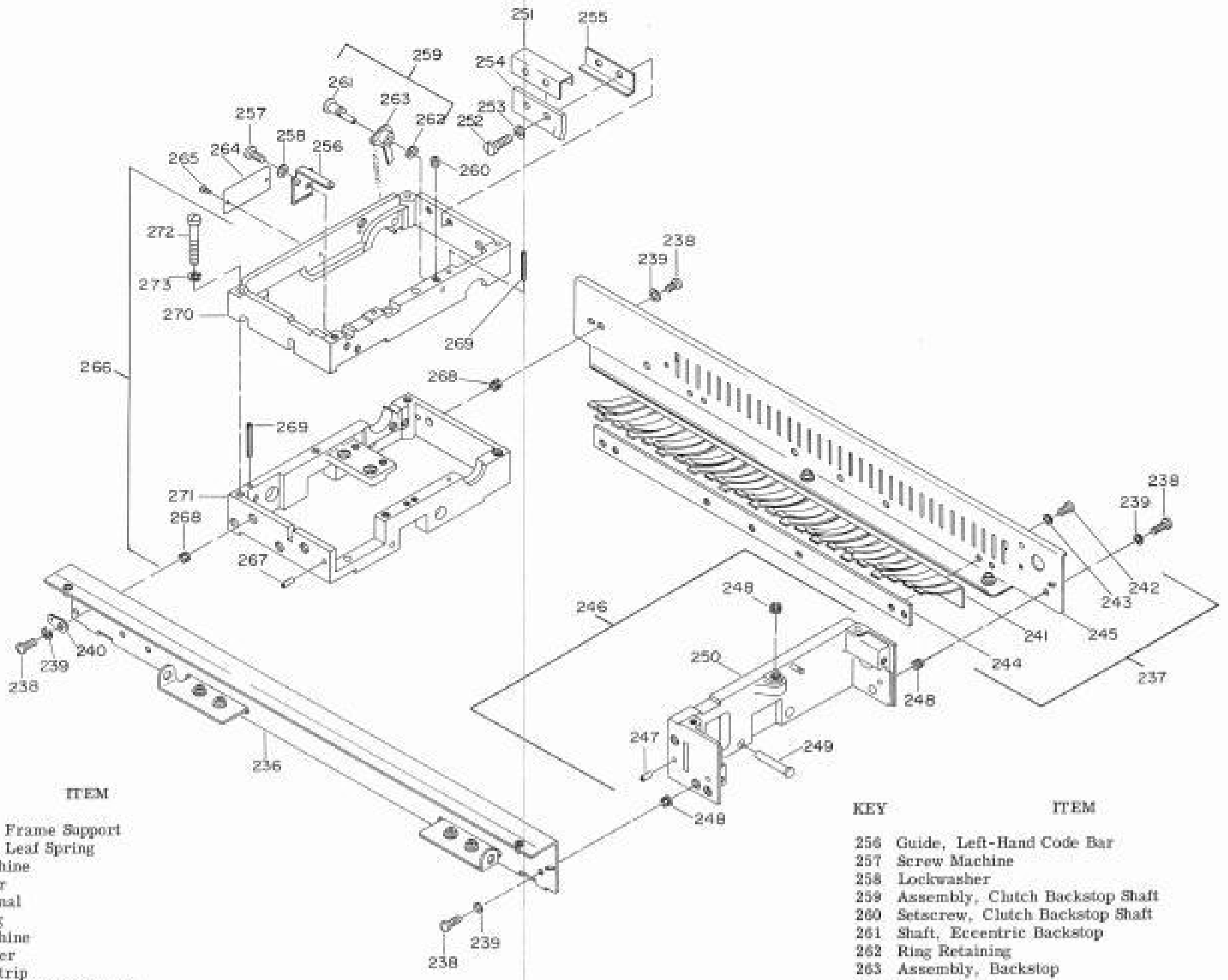
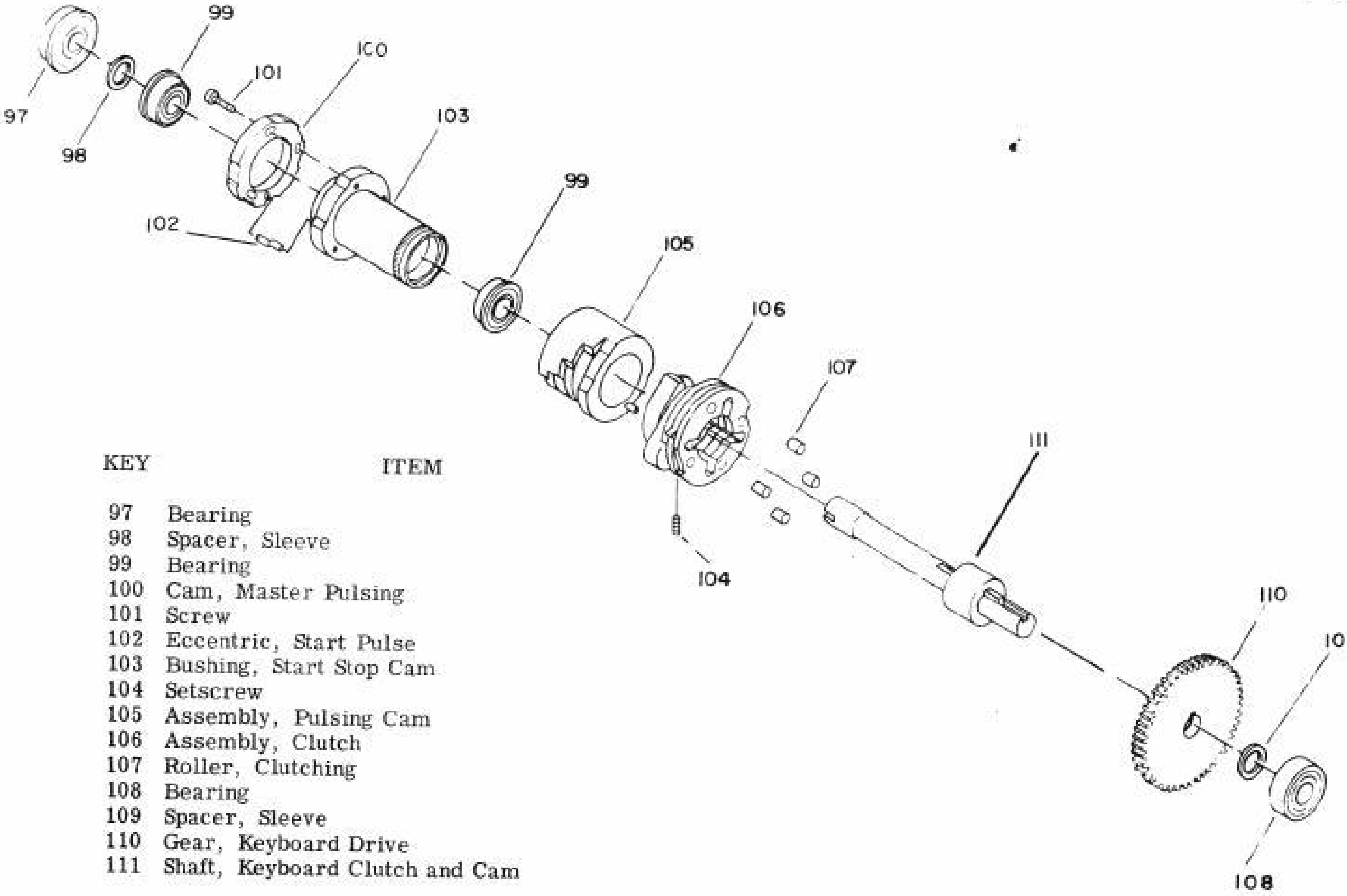


Figure 5-103. Keyboard Frame Assembly (Sheet 2 of 5)

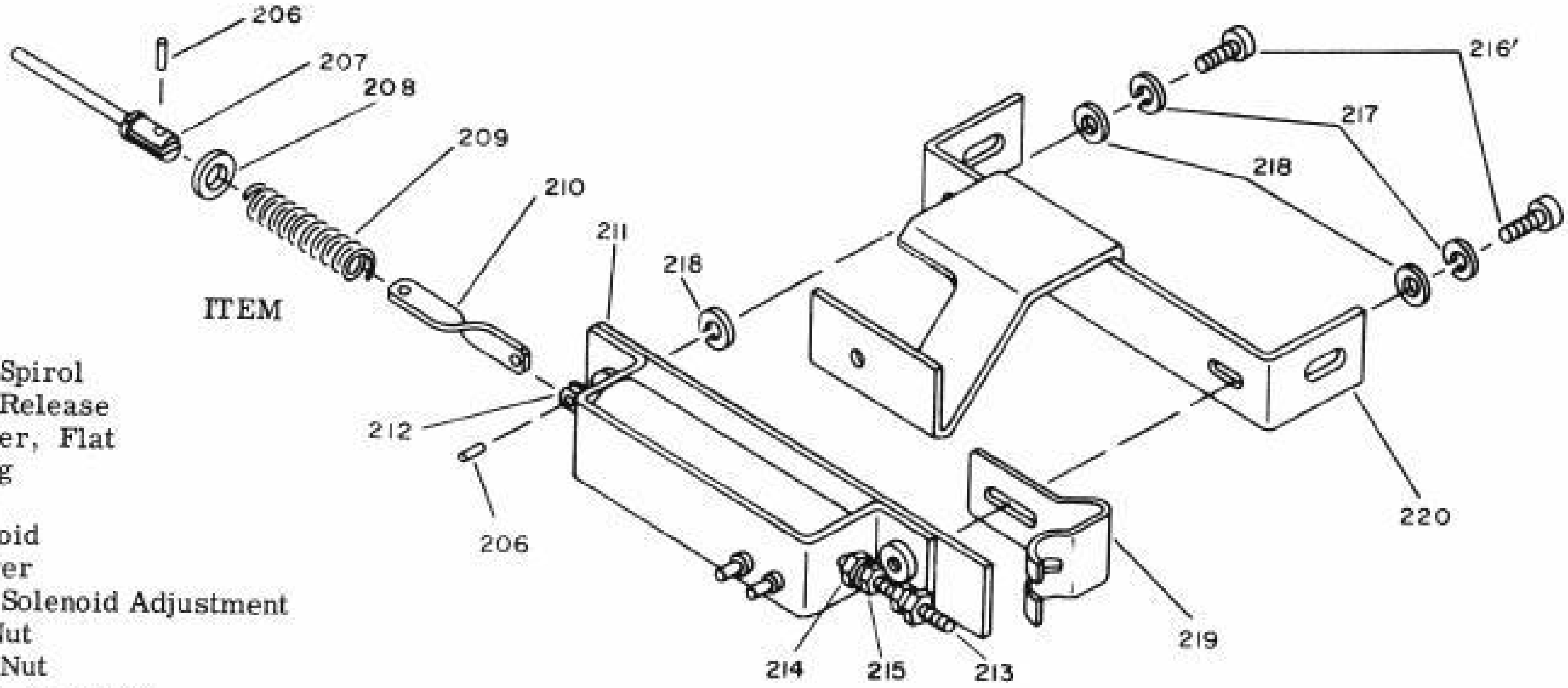
KEY	ITEM
236	Assembly, Frame Support
237	Assembly, Leaf Spring
238	Screw Machine
239	Lockwasher
240	Lug Terminal
241	Leaf Spring
242	Screw Machine
243	Lock Washer
244	Mounting Strip
245	Assembly, Keyboard Frame
246	Assembly Right-Hand Frame
247	Roll Pin
248	Tap Lock
249	Pin
251	Cam Wick Holder
252	Screw Machine
253	Lockwasher
254	Cam Wick
255	Bracket, Cam Wick

KEY	ITEM
256	Guide, Left-Hand Code Bar
257	Screw Machine
258	Lockwasher
259	Assembly, Clutch Backstop Shaft
260	Setscrew, Clutch Backstop Shaft
261	Shaft, Eccentric Backstop
262	Ring Retaining
263	Assembly, Backstop
264	Name Plate
265	Screw
266	Assembly, Left-Hand Frame
267	Roll Pin
268	Topback
269	Roll Pin
270	Frame, Top
271	Frame, Bottom
272	Screw Machine
273	Lockwasher



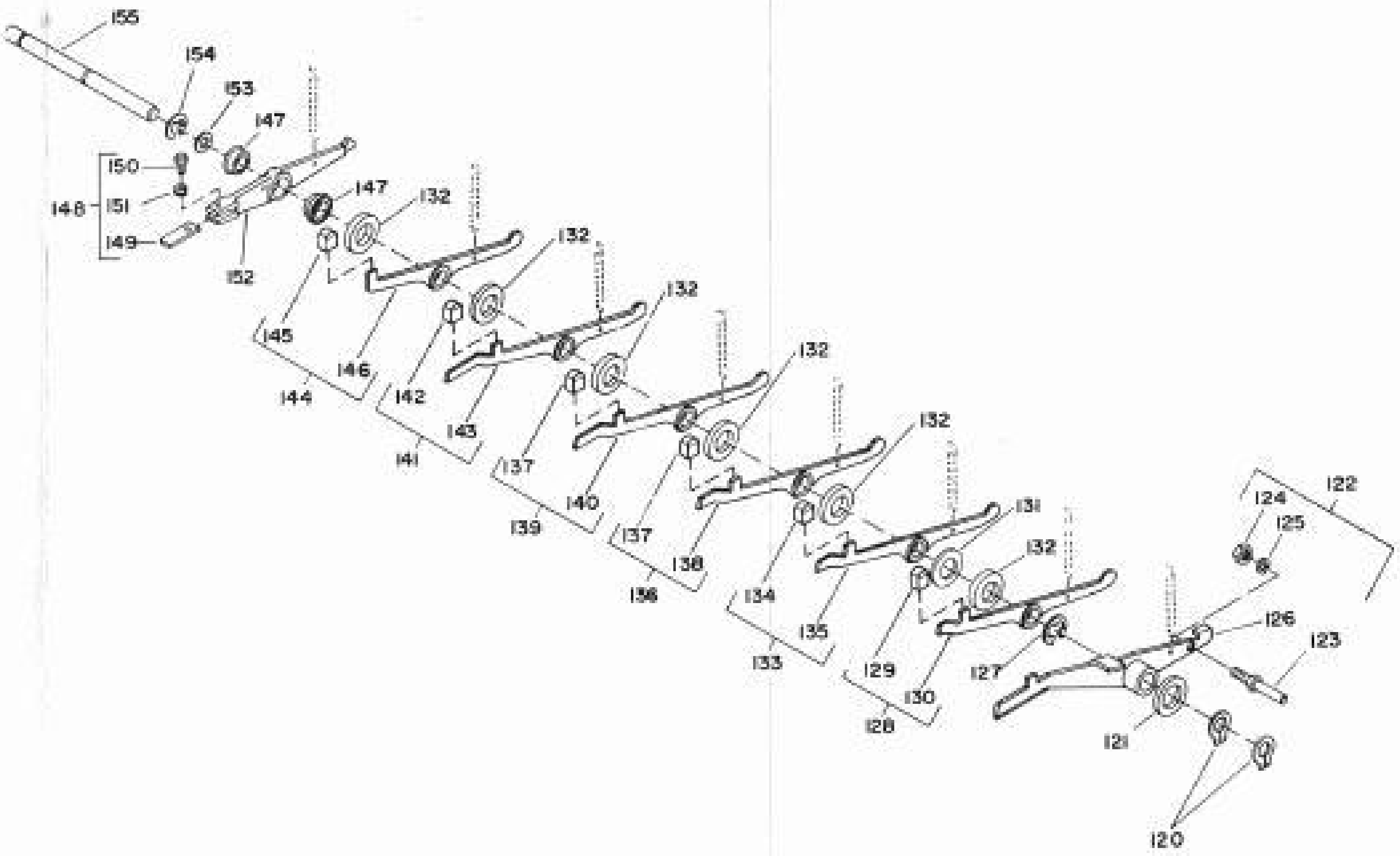
KEY	ITEM
97	Bearing
98	Spacer, Sleeve
99	Bearing
100	Cam, Master Pulsing
101	Screw
102	Eccentric, Start Pulse
103	Bushing, Start Stop Cam
104	Setscrew
105	Assembly, Pulsing Cam
106	Assembly, Clutch
107	Roller, Clutching
108	Bearing
109	Spacer, Sleeve
110	Gear, Keyboard Drive
111	Shaft, Keyboard Clutch and Cam

Figure 5-103. Keyboard Clutch and Cam Assembly (Sheet 3 of 5)



KEY	ITEM
206	Pin, Spirol
207	Pin, Release
208	Washer, Flat
209	Spring
210	Link
211	Solenoid
212	Plunger
213	Rod, Solenoid Adjustment
214	Hex Nut
215	Lock Nut
216	Screw, Machine
217	Washer, Lock
218	Washer, Flat
219	Leaf, Spring
220	Bracket, Mounting

Figure 5-103. Solenoid and Bracket Assembly (Sheet 4 of 5)



KEY	ITEM
120	Ring, Grip
121	Spacer
122	Assembly, Prevent Lever
123	Washer, Lock
124	Pin, Eccentric
125	Nut Hex
126	Lever, Prevent
127	Ring, Retaining
128	Finger Assembly, No. 5 Pulsing
129	Pusher
130	Finger
131	Shim
132	Washer, Felt
133	Finger Assembly, No. 4 Pulsing
134	Pusher
135	Finger
136	Finger Assembly, No. 3 Pulsing
137	Pusher
138	Finger
139	Finger Assembly, No. 2 Pulsing
140	Finger
141	Finger Assembly, No. 1 Pulsing
142	Pusher
143	Finger
144	Finger Assembly, Start Pulsing
145	Pusher
146	Finger
147	Bearing
148	Follower Assembly, Master Pulsing Contact
149	Actuator, Keyboard Contact
150	Screw, Machine
151	Washer, Lock
152	Follower, Cam
153	Spacer, Sleeve
154	Ring, Retaining
155	Shaft, Pulsing Finger and Prevent Lever

Figure 5-103. Master Pulsing Cam Follower, Pulsing and Prevent Lever Assembly (Sheet 5 of 5)

KEY	ITEM
1	Drum, Brake
2	Disk, Guide
3	Assembly, Drum
4	Nut
5	Washer, Lock
6	Pivot, Paper Brake Link
7	Link, Left-Hand Paper
8	Eccentric, Paper Brake Link
9	Spring, Paper Brake Link
10	Tube, Dancer Roll (Paper Brake Link)
11	Link, Right-Hand Paper Brake
12	Switch, Rotary Mode
13	Insulation, Shrink Sleeving
14	Switch, Motor Enable-Disable
15	Screw
16	Receptacle, Send-Receive Service Cable
17	Washer, Lock
18	Nut
19	Screw
20	Washer, Lock
21	Receptacle, Motor Plug
22	Fuseholder
23	Fuses
24	Kit, Running Spares
25	Grommet
26	Screw
27	Receptacle, Transformer
28	Washer, Lock
29	Nut
30	Receptacle, Primary Power Service Cable
31	Insulation, Shrink Sleeving
32	Transformer
33	Spacer
34	Nut
35	Washer
36	Clamp, Cable
37	Capacitor, Motor Starting
38	Lamp
39	Grommet
40	Diffuser, Lamp
41	Screw
42	Washer
43	Connector, Electronic Module Assembly Mounting
44	Screw
45	Relay, Motor Stop
46	Plate, Insulating
47	Screw
48	Washer, Lock
49	Switch, Copy Light
50	Bracket, Switch Protector
51	Switch, Motor and Main Power
52	Chassis
53	Screw
54	Resistor, Light Dimmer
55	Washer, Lock
56	Nut
57	Block, Contact
58	Insulator, Electronic Module
59	Strap, Guide Rail Support
60	Grommet
61	Guide, Latch and Circuit Board Support
62	Guide, Circuit Board Support
63	Assembly, Electronic Module

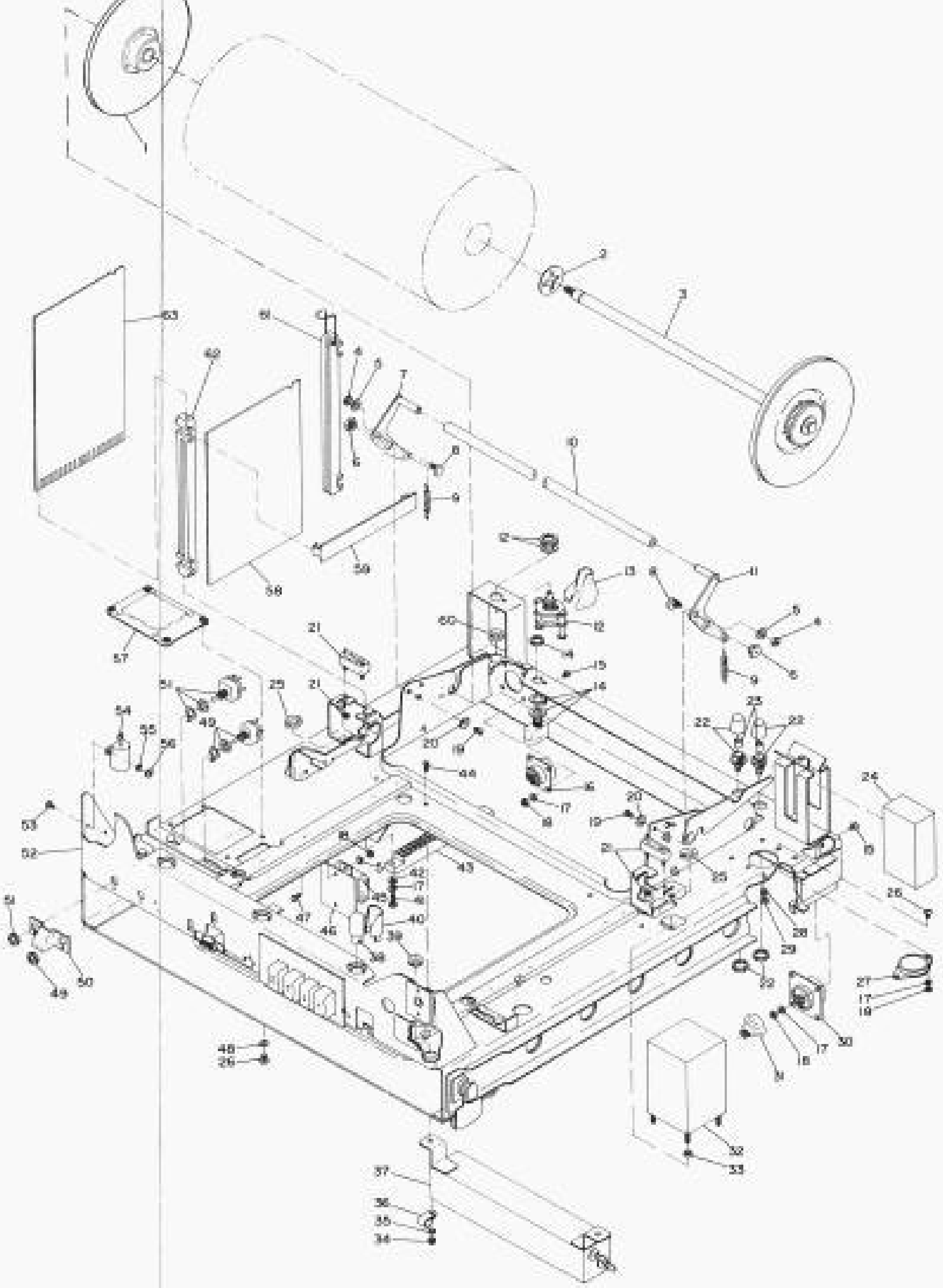
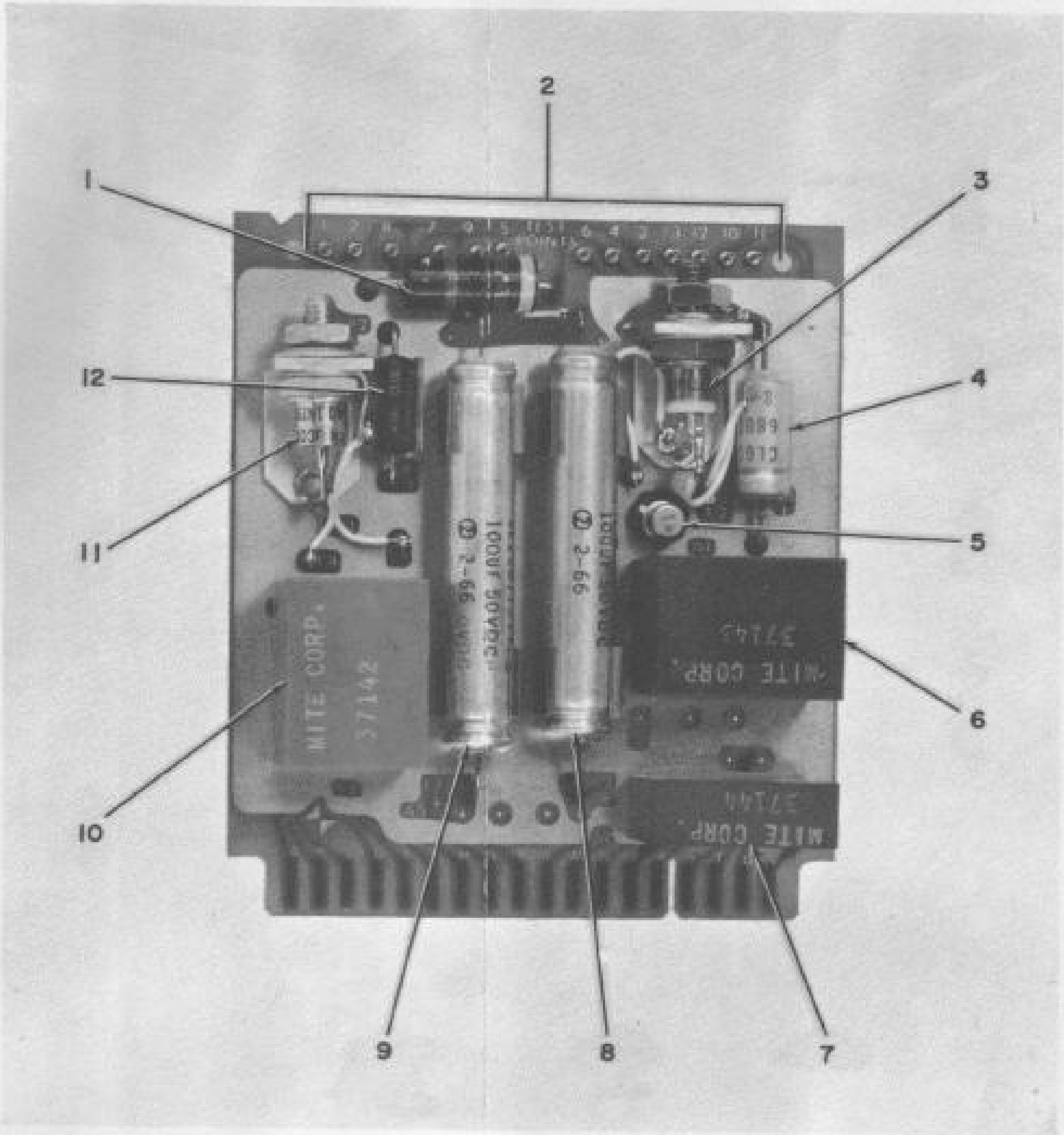
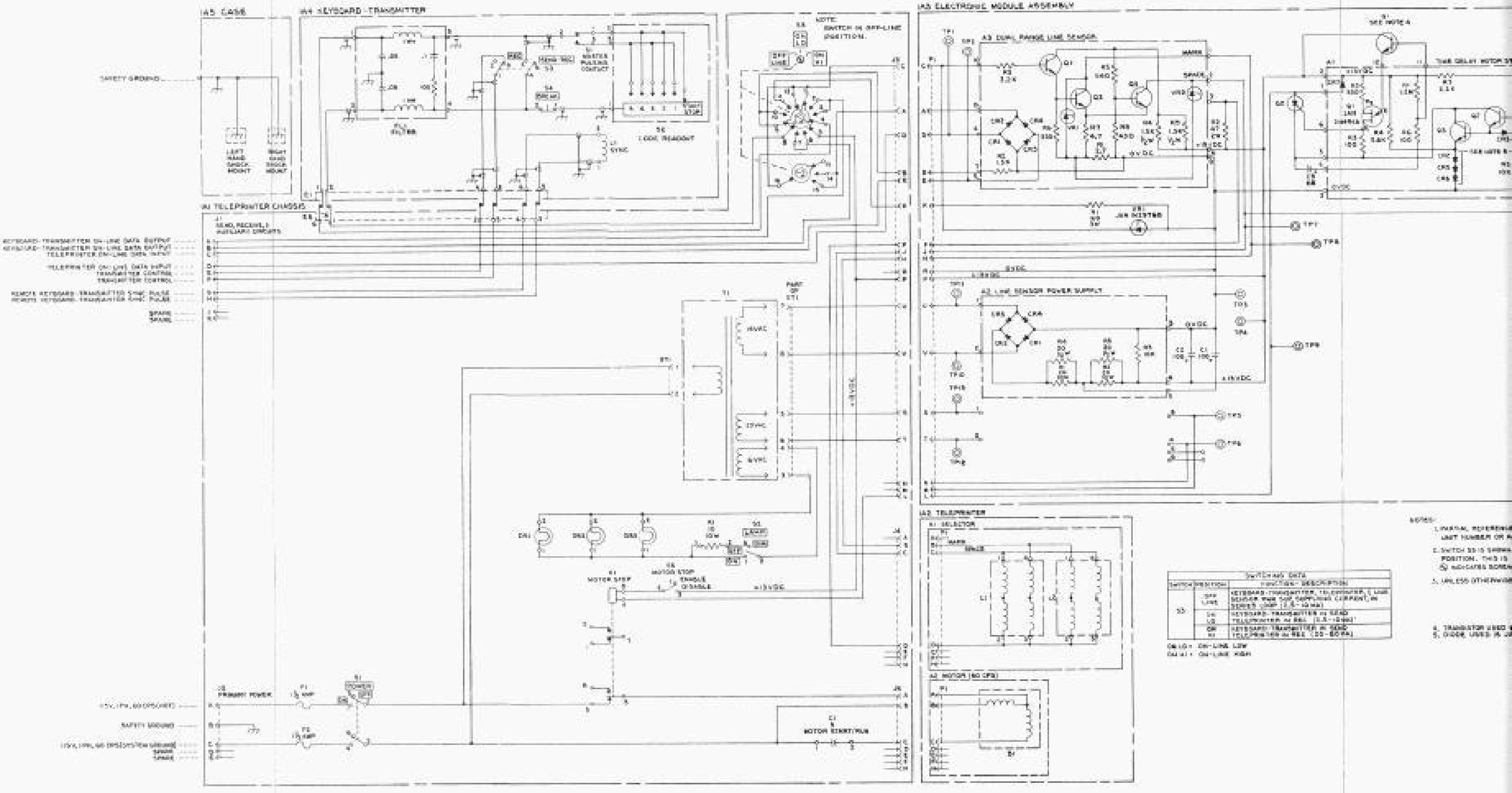


Figure 5-104. Electrical Chassis Assembly



KEY	ITEM
1	Resistor 1A3R2
2	Test Points on Electronic Module Board Assembly 1A3
3	Transistor 1A3Q2
4	Capacitor 1A3C3
5	Transistor 1A3Q1
6	Motor Stop Module 1A3A1
7	Line Sensor Module 1A3A2
8	Capacitor 1A3C2
9	Capacitor 1A3C1
10	Line Sensor Module 1A3A3

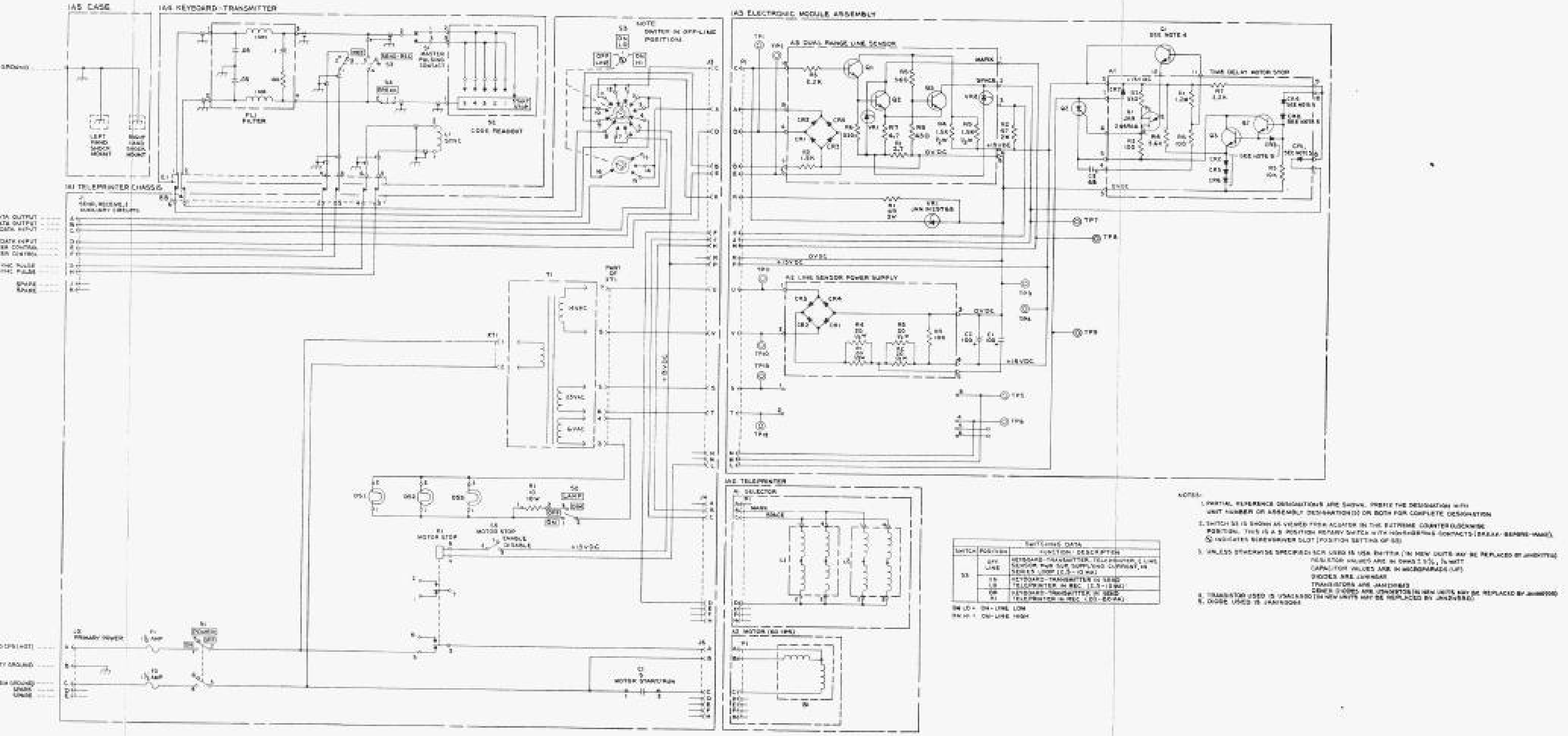
Figure 5-105. Electronic Module Assembly



SWITCHING DATA		
SWITCH	POSITION	FUNCTION - DESCRIPTION
S3	OFF LINE	KEYBOARD-TRANSMITTER, TELEPRINTER, & LINE SENSOR WITH LOOP SUPPLYING CURRENT IN SERIES LOOP (2.5-10 MA)
	ON LO	KEYBOARD-TRANSMITTER IN SEND TELEPRINTER IN REC (2.5-10 MA)
	ON HI	KEYBOARD-TRANSMITTER IN SEND TELEPRINTER IN REC (20-60 MA)

ON LO = ON-LINE LOW
ON HI = ON-LINE HIGH

Figure 5-106. Schematic Diagram, Telet



NOTES:

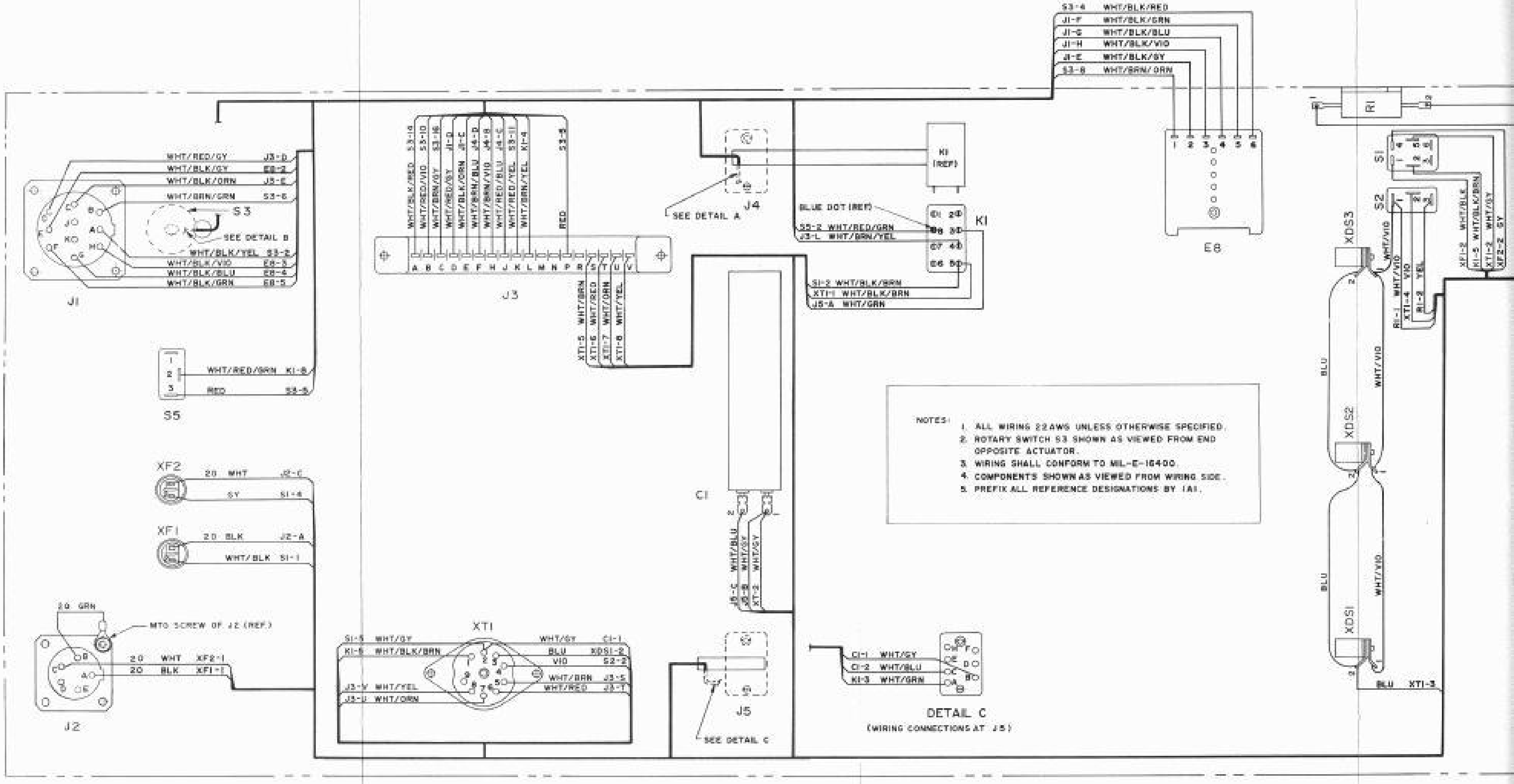
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION(S) OR BOTH FOR COMPLETE DESIGNATION.
2. SWITCH S3 IS SHOWN AS VIEWED FROM ACTUATOR IN THE EXTREME COUNTERCLOCKWISE POSITION. THIS IS A 3 POSITION ROTARY SWITCH WITH NONSHORTING CONTACTS (BREAK-BEFORE-MAKE). Ⓢ INDICATES SCREWDRIVER SLOT (POSITION SETTING OF S3)
3. UNLESS OTHERWISE SPECIFIED: SCR USED IS USA 2N1771A (IN NEW UNITS MAY BE REPLACED BY JAN2N1771A)
   RESISTOR VALUES ARE IN OHMS ±5%, ½ WATT
   CAPACITOR VALUES ARE IN MICROFARADS (UF)
   DIODES ARE JAN1N645
   TRANSISTORS ARE JAN2N1893
   ZENER DIODES ARE USA1N970B (IN NEW UNITS MAY BE REPLACED BY JAN1N970B)
4. TRANSISTOR USED IS USA2N3250 (IN NEW UNITS MAY BE REPLACED BY JAN2N3250)
5. DIODE USED IS JAN1N3064

SWITCHING DATA

SWITCH	POSITION	FUNCTION - DESCRIPTION
S3	OFF LINE	KEYBOARD-TRANSMITTER, TELEPRINTER, & LINE SENSOR PWR SUP SUPPLYING CURRENT, IN SERIES LOOP (5.5-10 MA)
	ON LO	KEYBOARD-TRANSMITTER IN SEND TELEPRINTER IN REC. (5.5-10 MA)
	ON HI	KEYBOARD-TRANSMITTER IN SEND TELEPRINTER IN REC. (20-60 MA)

ON LO = ON-LINE LOW
ON HI = ON-LINE HIGH

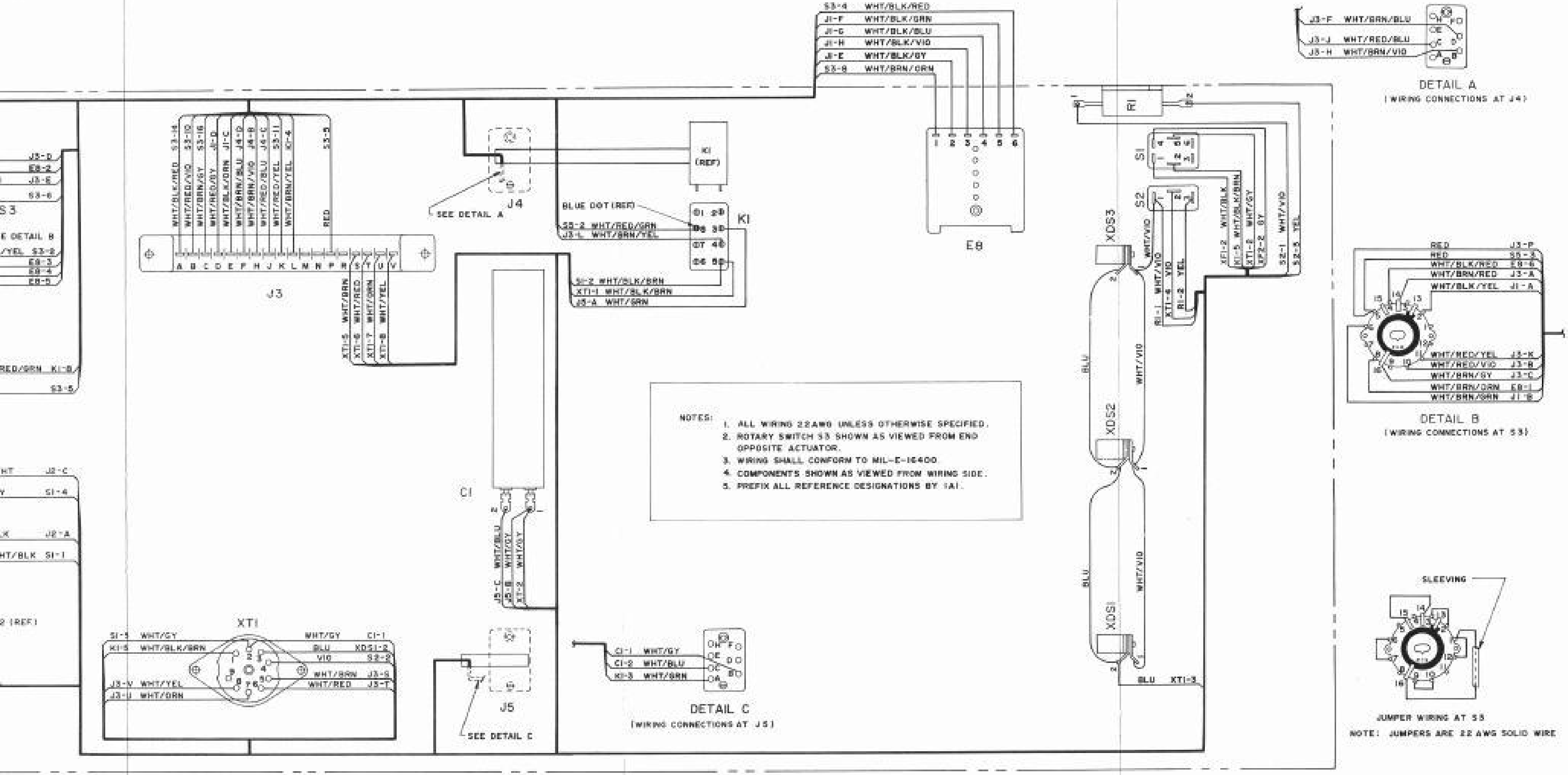
Figure 5-106. Schematic Diagram, Teletypewriter Set AN/UGC-41



NOTES:

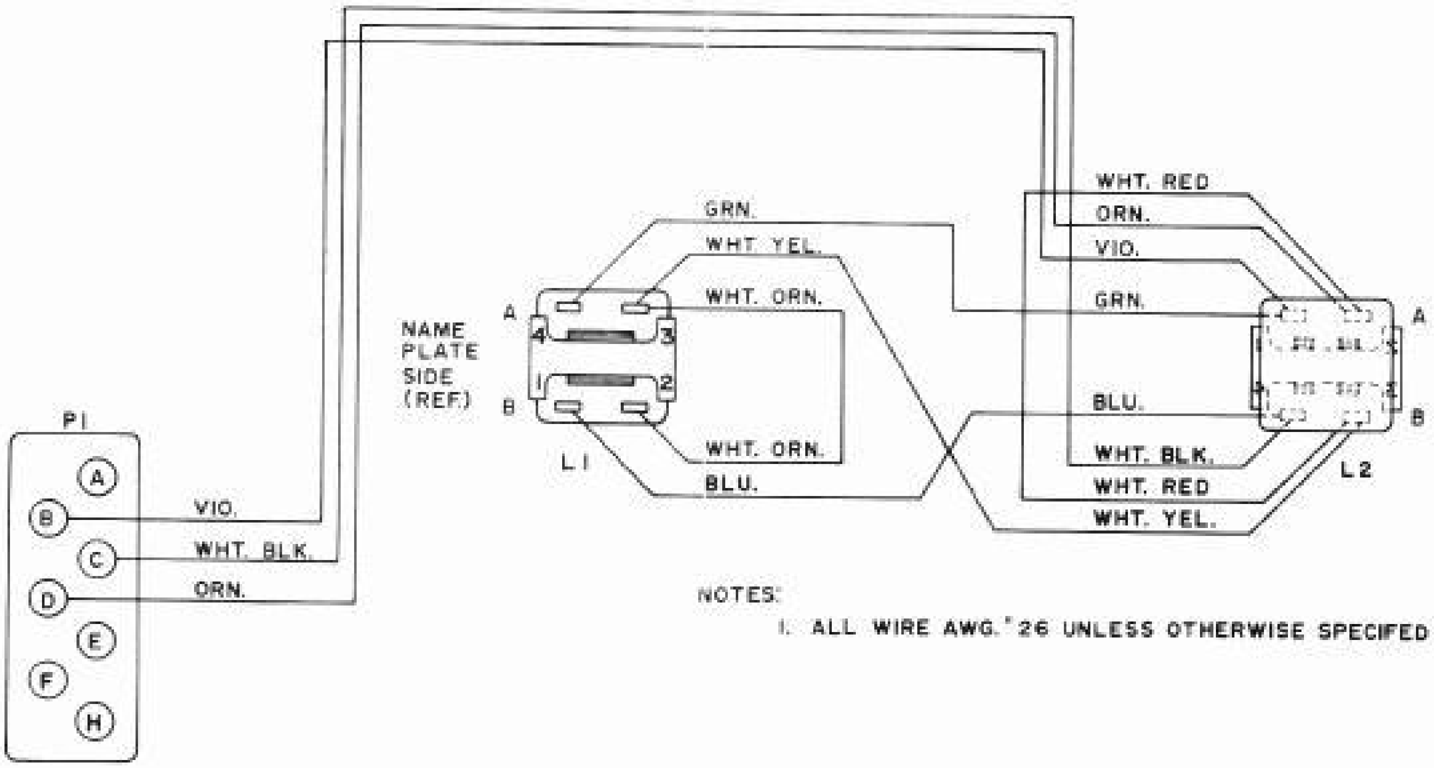
1. ALL WIRING 22 AWG UNLESS OTHERWISE SPECIFIED.
2. ROTARY SWITCH S3 SHOWN AS VIEWED FROM END OPPOSITE ACTUATOR.
3. WIRING SHALL CONFORM TO MIL-E-16400.
4. COMPONENTS SHOWN AS VIEWED FROM WIRING SIDE.
5. PREFIX ALL REFERENCE DESIGNATIONS BY 1A1.

Figure 5-107. Wiring Diagram, C



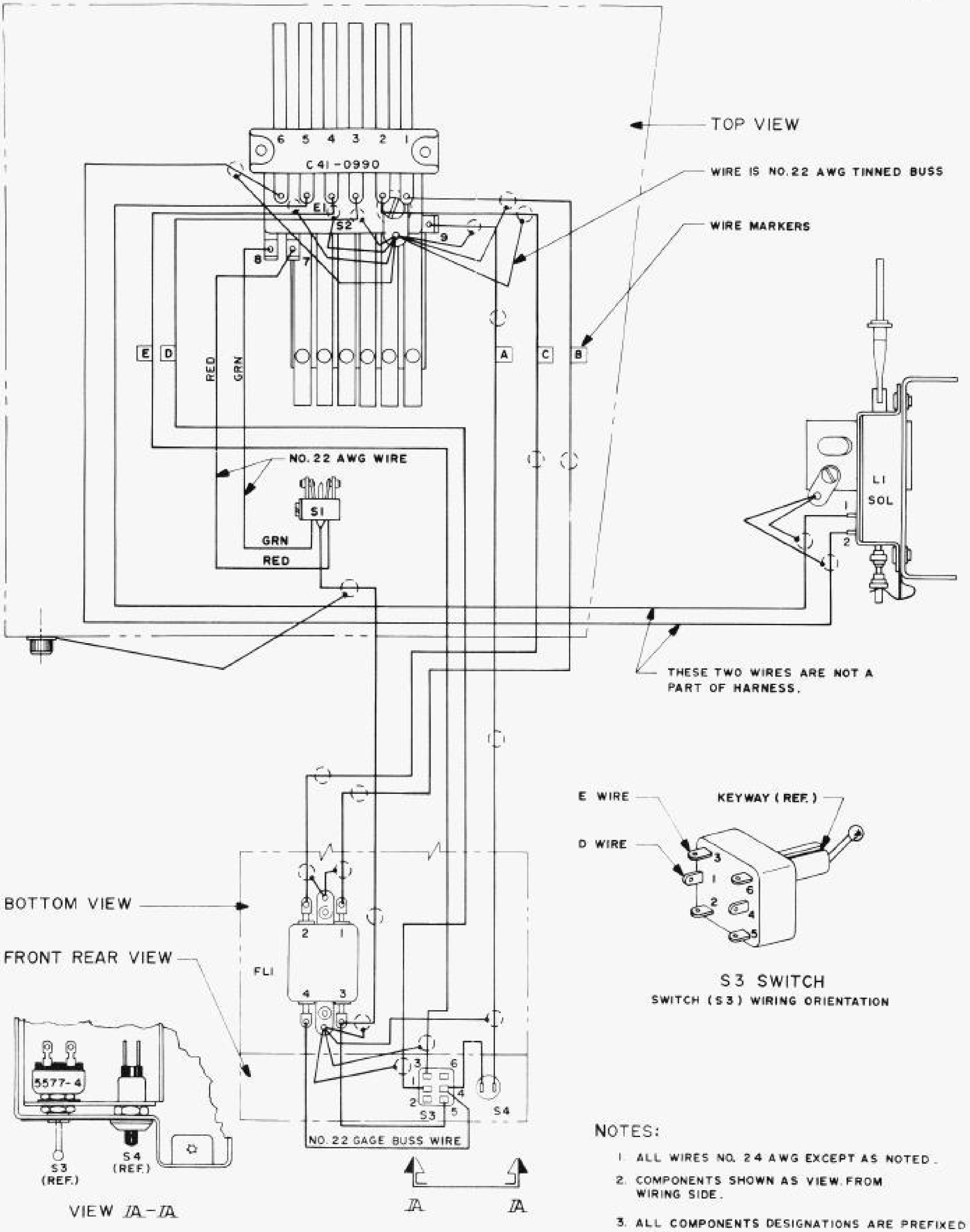
NOTES:
1. ALL WIRING 22AWG UNLESS OTHERWISE SPECIFIED.
2. ROTARY SWITCH S3 SHOWN AS VIEWED FROM END OPPOSITE ACTUATOR.
3. WIRING SHALL CONFORM TO MIL-E-16400.
4. COMPONENTS SHOWN AS VIEWED FROM WIRING SIDE.
5. PREFIX ALL REFERENCE DESIGNATIONS BY 1A1.

Figure 5-107. Wiring Diagram, Chassis (AN/UGC-41)



NOTES:
1. ALL WIRE AWG. "26 UNLESS OTHERWISE SPECIFED

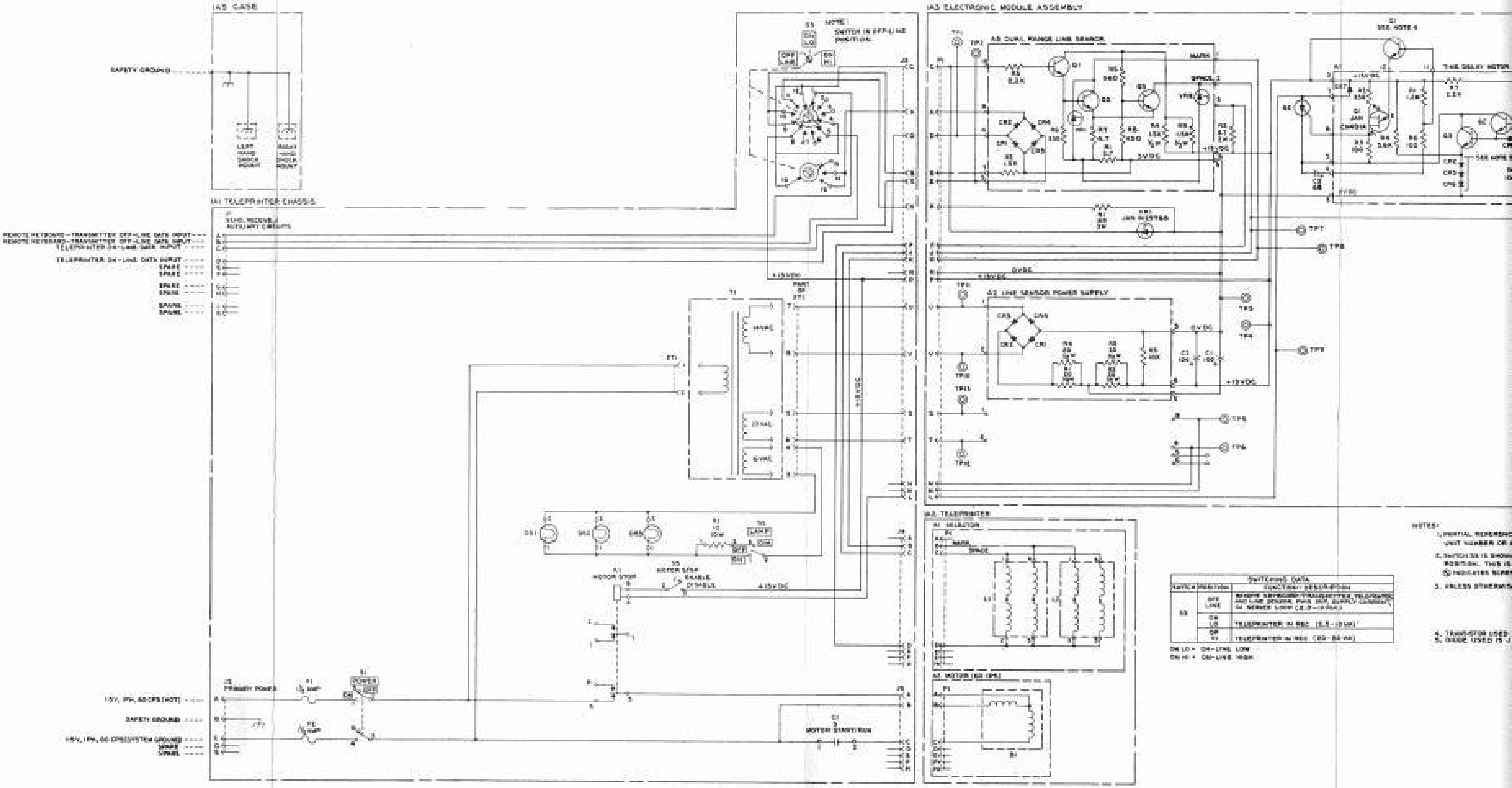
Figure 5-108. Wiring Diagram, Selector



NOTES:

1. ALL WIRES NO. 24 AWG EXCEPT AS NOTED.
2. COMPONENTS SHOWN AS VIEW FROM WIRING SIDE.
3. ALL COMPONENTS DESIGNATIONS ARE PREFIXED BY 1A9.

Figure 5-109. Wiring Diagram, Keyboard-Transmitter



SWITCHING DATA		
SWITCH	POSITION	FUNCTION - DESCRIPTION
S3	OFF LINE	REMOTE KEYBOARD-TRANSMITTER, TELEPRINTER AND LINE SENSOR PWR SUP SUPPLY CURRENT IN SERIES LOOP (2.5-10 MA)
	ON LO	TELEPRINTER IN REC (2.5-10 MA)
	ON HI	TELEPRINTER IN REC (20-60 MA)

ON LO = ON-LINE LOW
ON HI = ON-LINE HIGH

NOTES:

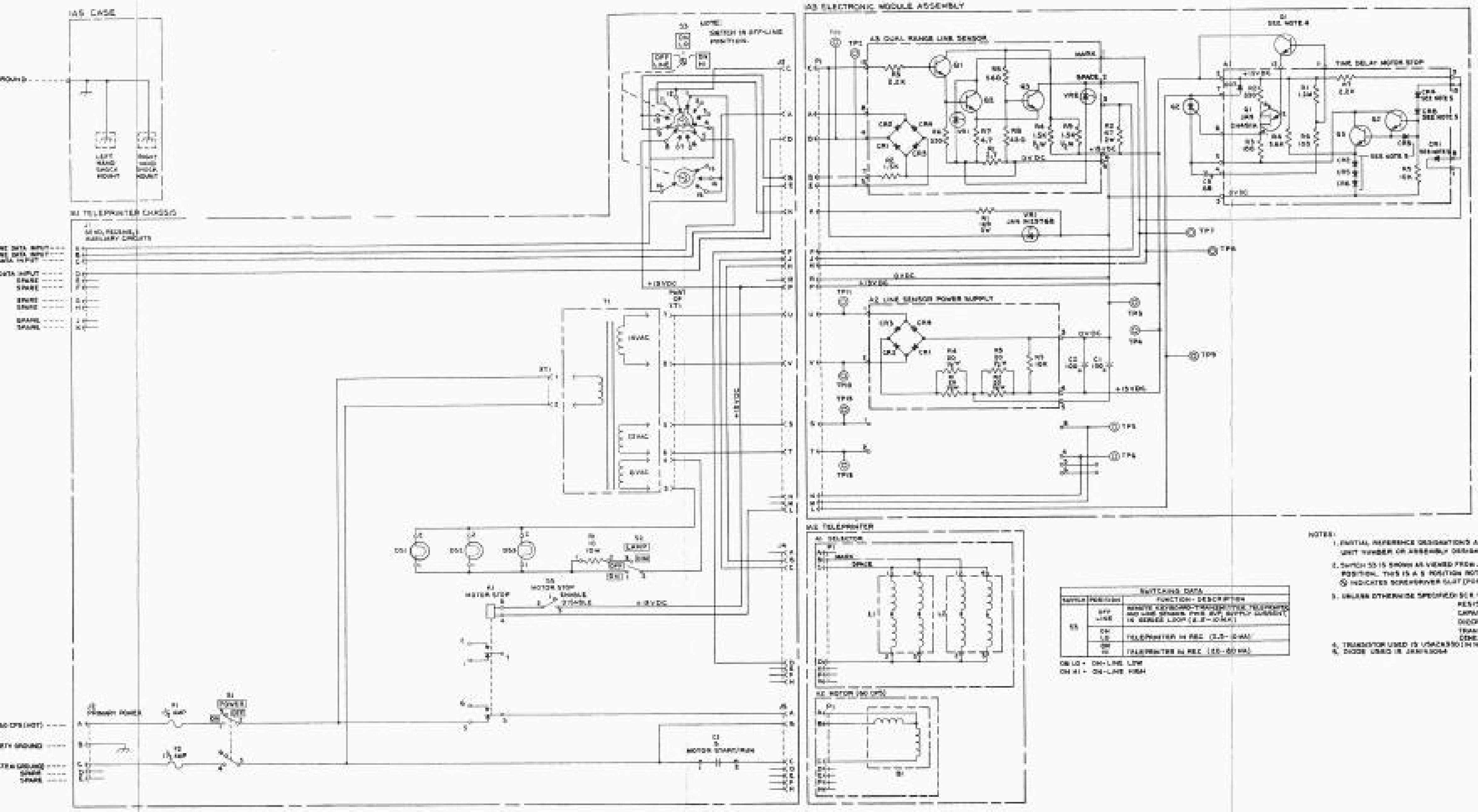
1. PARTIAL REFERENC
UNIT NUMBER OR

2. SWITCH S3 IS SHOW
POSITION. THIS IS
⊗ INDICATES SCRE

3. UNLESS OTHERWIS

4. TRANSISTOR USED
5. DIODE USED IS J

Figure 5-110. Schematic Diagram, Teleprinter S



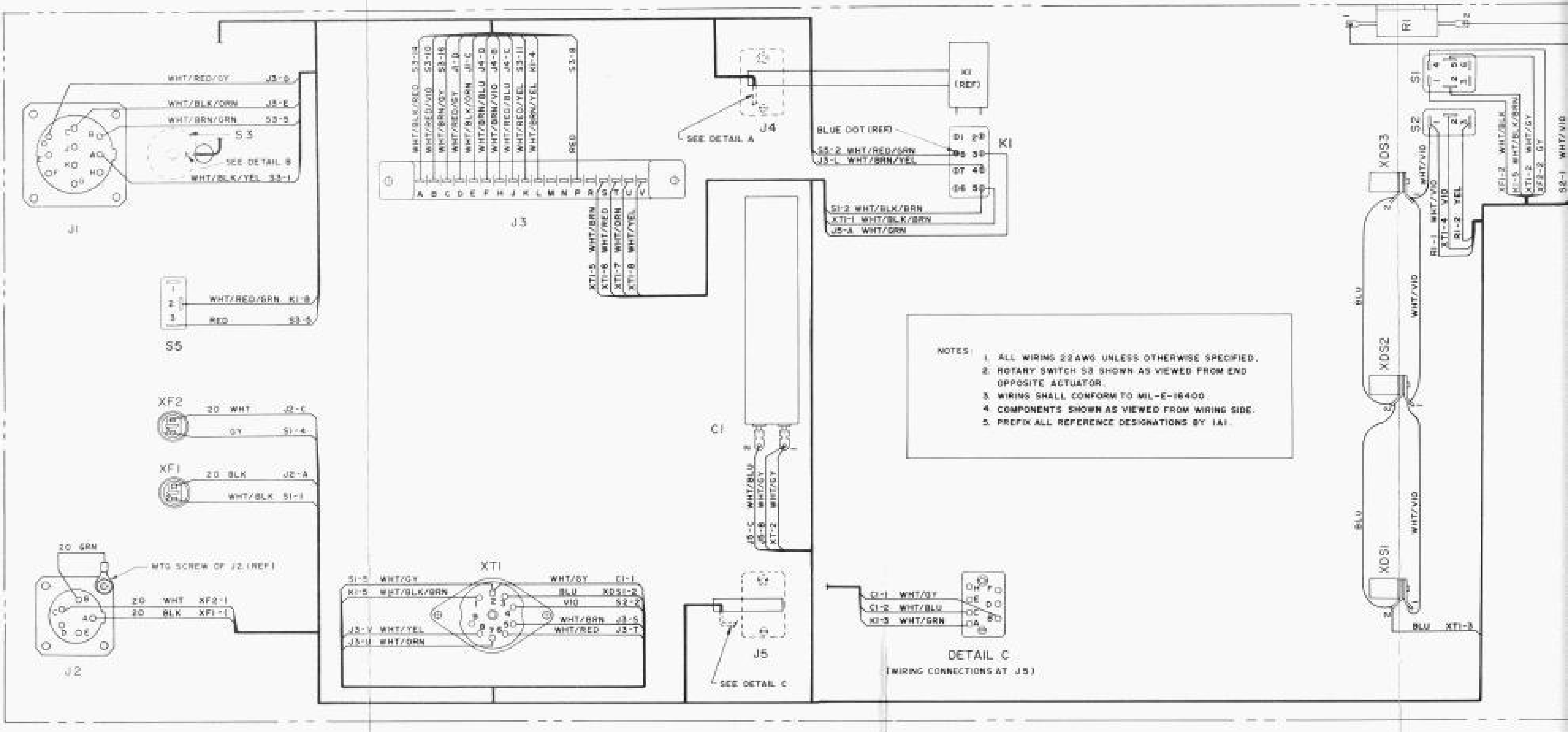
NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION(S) OR BOTH FOR COMPLETE DESIGNATION.
2. SWITCH S3 IS SHOWN AS VIEWED FROM ACTUATOR IN THE EXTREME COUNTERCLOCKWISE POSITION. THIS IS A 3 POSITION ROTARY SWITCH WITH NONSHORTING CONTACTS (BREAK-BEFORE-MAKE). ⊗ INDICATES SCREWDRIVER SLOT (POSITION SETTING OF S3)
3. UNLESS OTHERWISE SPECIFIED: SCR USED IS USN 2N1771A (IN NEW UNITS MAY BE REPLACED BY JAN2N1771A)
   RESISTOR VALUES ARE IN OHMS ± 5%, ½ WATT
   CAPACITOR VALUES ARE IN MICROFARADS (UF)
   DIODES ARE JAN1N645
   TRANSISTORS ARE JAN2N1893
   ZENER DIODES ARE USN1N3016 (IN NEW UNITS MAY BE REPLACED BY JAN1N3016B)
4. TRANSISTOR USED IS USA2N3350 (IN NEW UNITS MAY BE REPLACED BY JAN2N3350)
5. DIODE USED IS JAN1N3064

SWITCHING DATA		
SWITCH	POSITION	FUNCTION - DESCRIPTION
S5	OFF LINE	REMOTE KEYBOARD-TRANSMITTER, TELEPRINTER AND LINE SENSOR, FROM 8VP SUPPLY CURRENT IN SERIES LOOP (2.5 - 10 MA)
	ON LO	TELEPRINTER IN REC (2.5 - 10 MA)
	ON HI	TELEPRINTER IN REC (55 - 60 MA)

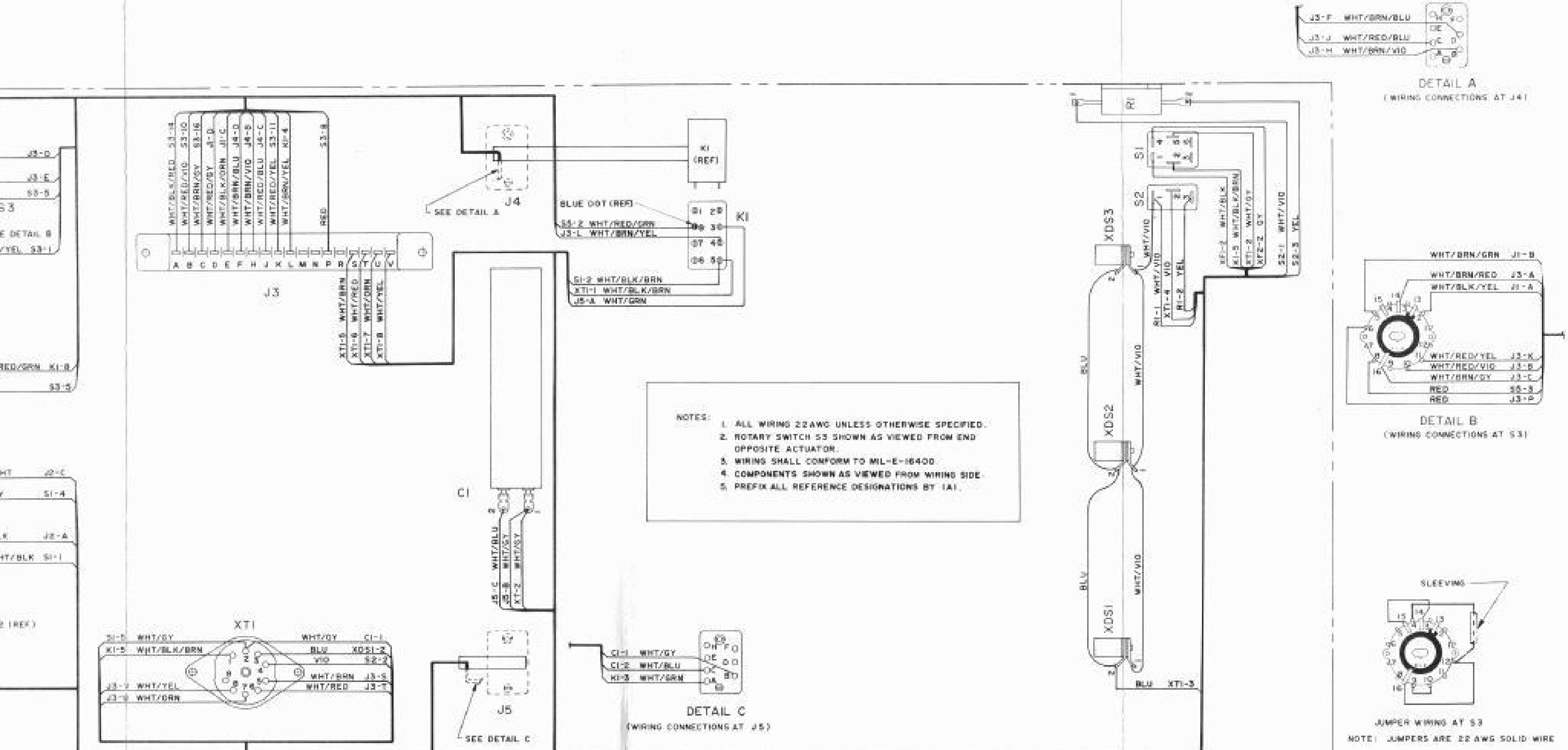
ON LO - ON-LINE LOW
ON HI - ON-LINE HIGH

Figure 5-110. Schematic Diagram, Teleprinter Sets AN/UGC-38 and AN/UGC-40



NOTES:
1. ALL WIRING 22AWG UNLESS OTHERWISE SPECIFIED.
2. ROTARY SWITCH S3 SHOWN AS VIEWED FROM END OPPOSITE ACTUATOR.
3. WIRING SHALL CONFORM TO MIL-E-16400.
4. COMPONENTS SHOWN AS VIEWED FROM WIRING SIDE.
5. PREFIX ALL REFERENCE DESIGNATIONS BY 1A1.

Figure 5-111. Wiring Diagram, Chassis (AN



NOTES:
1. ALL WIRING 22AWG UNLESS OTHERWISE SPECIFIED.
2. ROTARY SWITCH S3 SHOWN AS VIEWED FROM END OPPOSITE ACTUATOR.
3. WIRING SHALL CONFORM TO MIL-E-16400.
4. COMPONENTS SHOWN AS VIEWED FROM WIRING SIDE.
5. PREFIX ALL REFERENCE DESIGNATIONS BY 1A1.

Figure 5-111. Wiring Diagram, Chassis (AN/UGC-38 and AN/UGC-40)

SECTION 6
PARTS LIST

6-1 INTRODUCTION

6-1.1 This Parts List and Illustrated Parts Breakdown Lists, describes and illustrates the Parts for the Teleprinter AN/UGC-38, Part Number 37501, AN/UGC-40, Part Number 37500, and the Teletypewriter Set AN/UGC-41, Part Number 37502, all manufactured by the MITE Corporation, New Haven, Connecticut. The difference between these machines is indicated by a code in the useable on code column. This column is explained in Section 6-2.8. This breakdown will be used for requisitioning, storing, issuing, and identifying parts. This parts list consists of three (3) Sections as follows:

6-1 Group Assy Parts List
6-2 Numerical Index
6-3 Maintenance Parts List
(Reference Designation Index in detail)

6-2 GROUP ASSEMBLY PARTS LIST

6-2.1 GENERAL. Section I Group Assembly Parts List, consists of a breakdown of the complete unit into sub-assemblies and detailed parts. Each assembly is listed in its order of disassembly and is followed immediately by its components parts properly indented below it, to show their relationship to the assembly. Attaching parts are listed immediately following the parts which they attach. Items which are made from raw stock, such as cut lengths of wire, insulating materials, and seal wire are not included in the Group Assembly Parts List.

6-2.2 FIGURE AND INDEX NUMBER COLUMN. In this column, the digits preceding the hyphen refer to the figure in the Parts Breakdown on which a part or assembly is illustrated. The digits following the hyphen are the index numbers of procurable parts and assemblies. The index numbers are numerically arranged in the Group Assembly Parts List and are used mainly to assist in locating a part in the Group Assembly Parts List after it has been found in the Numerical Index.

6-2.3 PART NUMBER COLUMN. In this column are listed either the MITE part numbers, AN(Air Force-Navy) JAN (Joint Army Navy) MS(Military Standard) part numbers or part numbers of vendors other than MITE. (If part numbers other than MITE part numbers are listed, the equivalent MITE part number can be located to the right of the description column).

6-2.4 DESCRIPTION COLUMN. In this column is listed each assembly and attaching parts, and components of the assembly. The indenture of the listings indicates the relationship of component parts to their assembly.

6-2.5 MANUFACTURER'S CODE. At the end of the description column is the manufacturer's code as assigned by Cataloging Handbook H4-1, Federal Supply Code for Manufacturers. When no code is given the Manufacturer is the MITE Corporation.

6-2.6 MANUFACTURER'S CODE SYMBOLS. The code symbols used in this Illustrated Parts Breakdown together with the name and address of the manufacturer, are as follows:

MANUFACTURER'S CODE

CODE	NAME AND ADDRESS
26344	MITE Corporation New Haven, Connecticut
56878	Standard Pressed Steel Co. Jenkintown, Pa.
71400	Camloc Fastener Corp. New York, N. Y.
73957	Groov Pin Corp. Union City, N. J.
78189	Shakeproof Inc., Div. of Illinois Tool Works Chicago, Ill.
79136	Waldes Koh-I-Noor Inc. Long Island City, N. Y.
79963	Zierick Mfg. Corp. New Rochelle, N. Y.
80120	Schnitzer Alloy Products Co. Elizabeth, N. J.
80756	Ramsey Corp. St. Louis, Mo.
81349	Military Specifications
88044	Aeronautical Standards Group Departments of Air Force & Navy Washington, D. C.

96906	Military Standards
97481	Joint Army-Navy Air Forces Standards

6-2.7 UNITS PER ASSEMBLY COLUMN. This column lists the quantity of assemblies or parts required in the immediately preceding assembly of which the given part or assembly is a component. "Ref" refers to an assembly which is completely assembled on a preceding illustration, and is now exploded on the illustration on which it is referenced.

6-2.8 USEABLE ON CODE COLUMN. Part variations within the groups of equipment are indicated by a letter symbol immediately following the units per assembly, in the "Useable on Code" column. To determine applicability of the codes used, the following cross reference is given:

CODE	APPLICABILITY
A	AN/UGC-41
B	AN/UGC-40
C	Applicable to all machines covered in this Parts List
D	AN/UGC-38
E	AN/UGC-40 and AN/UGC-41
F	AN/UGC-38 and AN/UGC-40

The primary difference between the above models is as follows:

AN/UGC-38:	Teleprinter, utilizing a weather code for Print Head characteristics and is a receiver only machine.
AN/UGC-40:	Teleprinter, utilizing a standard commercial code for Print Head characteristics and is a receiver only machine.
AN/UGC-41:	Teletypewriter Set utilizing a standard commercial code for Print Head characteristics and is a send-receive machine.

6-3 NUMERICAL INDEX

6-3.1 GENERAL. Section II Numerical Index is a complete listing of all part numbers that appear in the Group Assembly Parts List. The listing also includes Figure and Index Number and Source Codes.

6-3.2 PART NUMBER COLUMN. This column lists part numbers for procurable and non-procurable parts and assemblies in the Group Assembly Parts List.

6-3.3 FIGURE AND INDEX NUMBER COLUMN. In this column which appears in all sections, the digits preceding the dash refer to the figure in the Parts Breakdown on which the parts or assemblies are illustrated. The digits following the dash are the index numbers of procurable or non-procurable parts or assemblies. For Government or contractor standard Parts, the figure and index number shown in the Numerical Index is the figure and index for the first occurrence only of such parts in the Group Assembly Parts List.

6-3.4 SOURCE CODE COLUMN. SMR codes may not appear in this publication. The inclusion of this material depends upon the date this document is completely revised. SMR codes are to be used in determining the source maintenance echlon and recoverability of each item.

I. The following is the established format for SMR Codes;

Source	Maintenance		Recoverability
(1)	(2)	(3)	(4)

(1) Consumer
Source
Information

(2) Lowest maintenance echelon capable of installing part

(3) Lowest maintenance echelon capable of manufacturing, assembling or testing a part prior to installation

(4) Recoverability Status

II. DEFINITION AND APPLICATION OF CODE: The following definitions and applications are applicable for each code:

SOURCE CODES

PART PROCURED - SUPPLY SYSTEM STOCK

a. "A" Series-Assembly: Assembly not purchased

(1) CODE "AF" is applied to assemblies which are not purchased but which are to be assembled within activities prior to installation.

(2) CODE "AO" is applied to assemblies which are not purchased but which are to be assembled within overhaul/rework activities prior to installation.

(3) CODE "AOA" is applied to items to be assembled by the prime overhaul/rework point when required.

b. "M" Series- Manufactured items which are not purchased or stock numbered.

(1) CODE "MF" is applied to items which are capable of being manufactured within Fleet activities. Items coded "MF" have no anti-

cipated usage, or possess restrictive installation or storage factors. With respect to support equipment, the naval manufacturing activity may alter the design of Source Code "MF" material and/or processes provided that fit, function, use and safety are not impaired.

(2) CODE "MO" is applied to items which are capable of being manufactured within overhaul/rework activities. Items coded "MO" have no anticipated or relatively low usage or possess restrictive installation or storage factors or are manufactured more economically by the Government. With respect to support equipment, the naval manufacturing activity may alter design of Source Code "MO" material and/or processes provided that fit, function, use and safety are not impaired.

(3) CODE "MOA" is applied to items to be manufactured by the prime overhaul/rework point when required.

c. "N" Series- Not stocked normally: Will be purchased on demand.

(1) CODE "N" is applied to items which do not meet established criteria for stocking and which are readily available from commercial sources.

(2) CODE "N1" is applied to Bureau of Yards and Docks Supply Office ("Y") cognizance items under fraction code "A" which are: (1) commercially available to all continental United States activities, (2) authorized for local stocking at the retail level, (3) replenished by local purchase within the continental United States, (4) carried in wholesale stock only for overseas and fleet activities, and (5) stock numbered and published in the Navy Stock List of the Yards and Docks Supply Office.

d. "P" Series - Purchased items

(1) CODE "P" is applied to items which are purchased in view of known or anticipated high usage and which are relatively simple to manufacture within the Navy if necessary "P" means in system.

(2) CODE "P1" is applied to items which are purchased in view of known or anticipated usage and which are difficult, impractical, or uneconomical to manufacture within the Navy.

(3) CODE "P2" is applied to items for which little usage is anticipated, but which are purchased in limited quantity for insurance purposes. Items coded "P2" are difficult to manufacture, require special tooling or stock not normally available within the Naval Establishment or require long production lead time.

(4) CODE "P3" is applied to repair parts items which are purchased in limited quantity in accordance with life expectancy. Items coded "P3" are normally deteriorative in nature and may require special storage conditions.

(5) CODE "P4" is applied to items which are procured only for initial outfitting or for special control and n ot carried in system stock for replenishment purposes.

e. CODE "U" is applied when not of supply or maintenance stocking significance.

f. "X" Series - Not procured; Normally impractical for stocking, maintenance or manufacture.

(1) CODE "X" is applied to items which, if damaged, would require uneconomical repair. The need for an item or items coded "X" will normally result in recommendation for retirement of equipment from service.

(2) CODE "X1" is applied to items for which purchase of the next larger assembly Source Coded in the "P" series is justified.

(3) CODE "X2" is applied to items which are not purchased for stock, but may be acquired for use through salvage or one time purchase. Activities requiring such items will attempt to obtain them from salvage; if not obtainable from salvage or readily manufactured, such items shall be requisitioned through normal supply channels with supporting justification.

III MAINTENANCE CODES

Code	Maintenance Echelon (Navy Material)
O	Overhaul Activities
T	Tender or repair ships
F	Activity to which equipment is assigned (e. g., Vessel, FASRON, or self-supported squadron)
E	Specialized repair facilities
B	Specific maintenance requirements not applicable (optional)

Code	Maintenance Echelon (Marine Corps Material Only);
O	Organizational Maintenance (1st and 2nd echelon)

F	Field Maintenance (3rd echelon)
H	Field Maintenance (4th echelon)
D	Depot Maintenance (5th echelon)

Note: Navy Material includes all material unde the cognizance of inventory managers of the Commandant of the Marine Corps.

III. RECOVERABILITY CODES

Code	Definition and Application of Code
R	REPAIRABLE-Parts which are economical and practical to repair. Replacements are obtained from the supply system or an exchange basis, if and when practicable, i.e., a part may be lost or damaged beyond recognition or the inventory manager may not require such exchange.
S	SALVAGEABLE-Parts which are economical and practical to salvage and which may be placed in "Ready for Issue" condition by cleaning, replating, ancoizing, adjusting, replacement of bearing or bushings. "S" coded parts may contain parts or materials which are useable, valuable, or critical, and which may be placed in the supply system for issue.
C	CONSUMABLE. (Expendable)-Parts that are neither repairable nor salvageable (optional).

6-3.6 MATERIAL ACCOUNTABILITY, RECOVERABILITY CODE COLUMN. In this column is listed the recoverability coding as and when supplied by the Procuring Department. See Par. 6-3.5, III Recoverability Codes above.

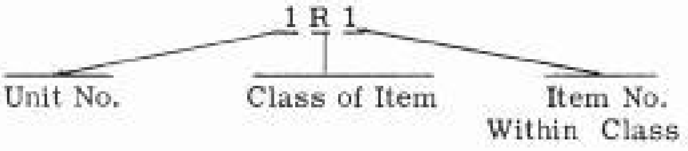
6-4 REFERENCE DESIGNATION INDEX

6-4.1 GENERAL. The Reference Designation Index, Section III lists reference designation symbols which have been established for any parts of the equipment covered. The listing also includes Figure and Index Number and Part Number.

6-4.2 REFERENCE DESIGNATION COLUMN. In this column are listed the assigned reference designation symbols, arranged in alphabetical numerical sequence. This column contains all reference designation symbols shown on schematic diagrams contained in Section 5 of NAVSHIPS 0967-170-8010 pertaining to the equipment covered by the Illustrated Parts Breakdown. Further, the below Examples will assist the reader in complete comprehension of this Reference Designation Column.

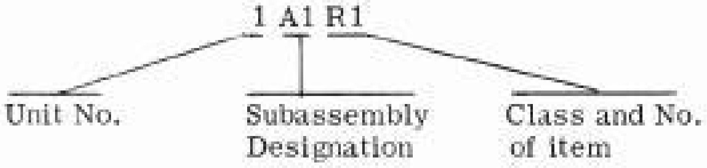
a. REFERENCE DESIGNATIONS-The unit numbering method of assigning reference designations has been used to identify units, assemblies subassemblies, and parts. This method has been expanded as much as necessary to adequately cover the various degrees of subdivision of the equipment. Examples of this unit numbering method and typical expansions of the same are illustrated by the following:

Example 1:



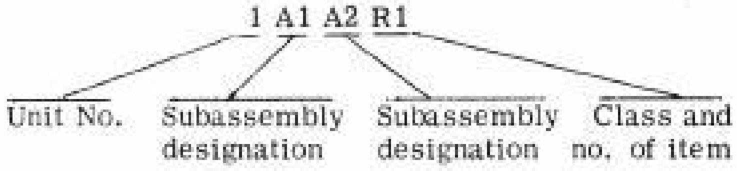
Read as: First (1) resistor (R) of first unit (1)

Example 2:



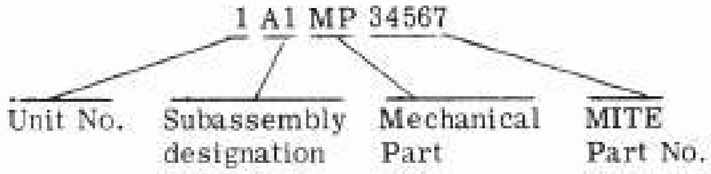
Read as: First (1) resistor (R) of first (1) subassembly (A) of first (1) unit

Example 3:



Read as: First (1) resistor (R) of second (2) subassembly (A) of first (1) subassembly (A) of third (1) unit.

Example 4:



Read as: Part No. (34567) a mechanical part (MP) of (1) subassembly (A) of (1) unit.

b. REF DESIG PREFIX-Partial reference designations are used on the equipment and illustrations. The partial reference designations consist of the class letter (s) and the identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Prefixes are proved on illustrations following the notation "REF DESIG PREFIX".

6-4.3 PART NUMBER COLUMN. In this column are listed the part numbers of those parts which have been assigned reference designation symbols.

6-5. LOCATION OF PARTS IN PARTS BREAKDOWN

6-5.1 The location of a part when the part number is known may be accomplished if the following steps are observed.

a. Locate the part number in the Numerical Index.

b. Note the figure and index number shown opposite the part number.

c. Locate the figure and index number in the Group Assembly Parts List.

6-5.2 The location of a part when the part number is not known may be accomplished if the following steps are observed.

a. Refer to the applicable assembly breakdown.

b. Compare the part with the illustration until the part is located.

c. Note the index number.

d. Locate the index number in the corresponding Group Assembly Parts List.

e. Opposite the index number is shown the part number and name.

6-5.3 The location of a part when the reference designation is known may be accomplished if the following steps are observed.

a. Locate the reference designation in the Reference Designation Index.

b. Note the figure and index number opposite it.

c. Locate the figure and index number in the Group Assembly Parts List.

d. Opposite the index number is shown the part number and name.

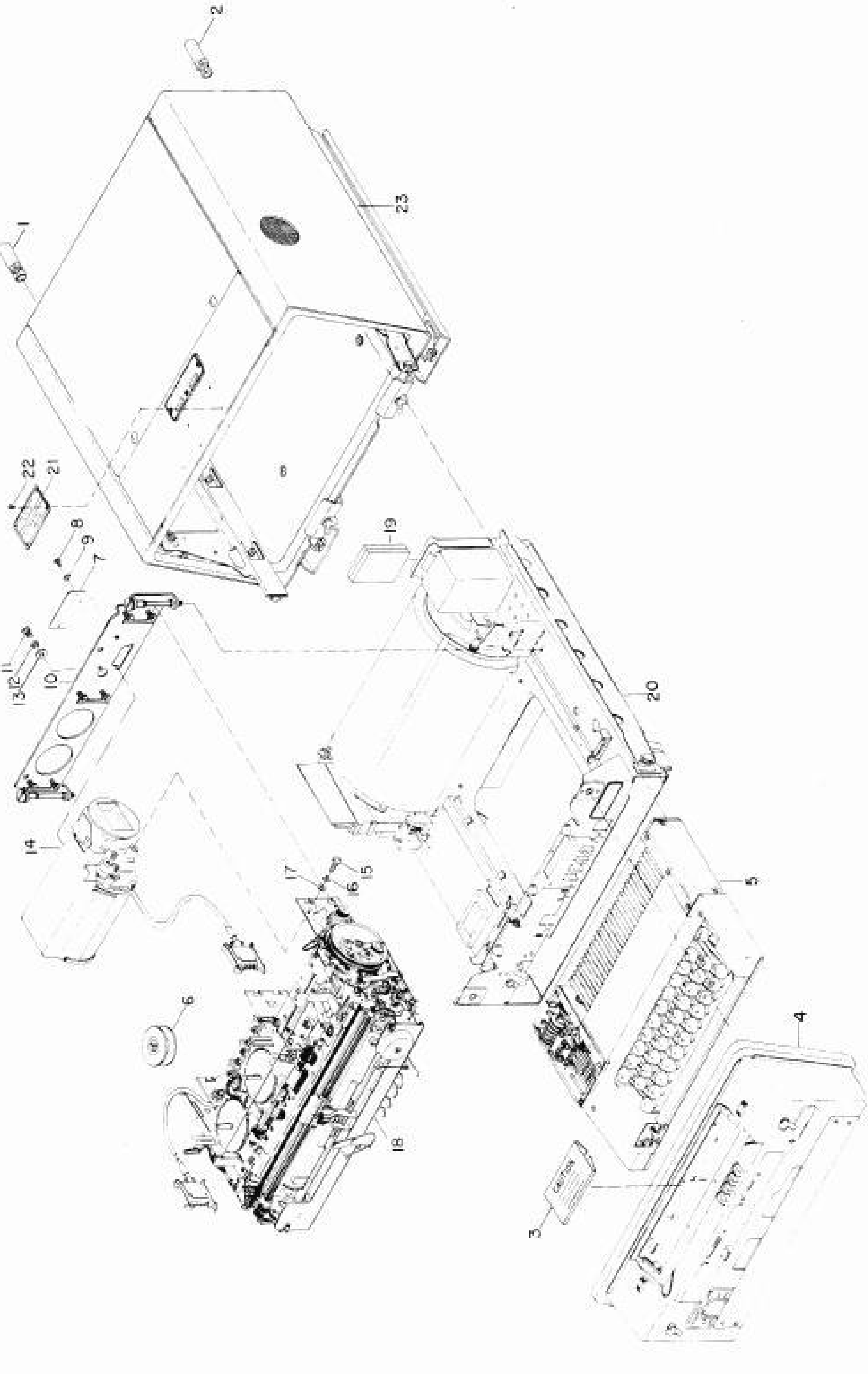


Figure 1. Teletypewriter-Teleprinter

SECTION I

GROUP ASSEMBLY PARTS LIST

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
		TELEPRINTER TELETYPEWRITER SET				
01 -000	37502	.TELETYPEWRITER				A
01 -000	37500	.TELEPRINTER SET				B
01 -000	37501	.TELEPRINTER SET				D
01 -001	MS3116F12-10S	..CONNECTOR	05511-0190	96906	1	C
01 -002	MS3116F14-5S	..CONNECTOR	05511-0188	96906	1	C
01 -003	30898	..LABEL CAUTION			1	C
01 -004	37741-0003	..COVER ASSEMBLY			1	A
01 -004	37741-0004	..COVER ASSEMBLY			1	F
01 -005	37948	..KEYBOARD ASSY			1	A
01 -006	05048-0001	..RIBBON			1	C
01 -007	38474-0003	..PLATE IDENT			1	A
01 -007	38474-0002	..PLATE IDENT			1	B
01 -007	38474-0001	..PLATE IDENT			1	D
		- - - AP - - -				
01 -008	05007-0055	..SCREW MACHINE			2	C
01 -009	05006-0002	..WASHER			2	C
		- - - * - - -				
01 -010	01965-0002	..PLATE ASSY			1	C
01 -011	05007-0080	..SCREW MACHINE			3	C
01 -012	05006-0006	..WASHER LOCK			3	C
01 -013	05032-0009	..WASHER FLAT			3	C
01 -014	34258-0002	..MUT&FAN HSGASSY			1	C
01 -015	05007-0081	..SCREW MACHINE			2	C
01 -016	AN935-5L	..WASHER LOCK	05006-0005	88044	2	C
01 -017	05032-0003	..WASHER FLAT			2	C
01 -018	37744-0003	..PRINTER ASSY			1	A
01 -018	37744-0001	..PRINTER ASSY			1	B
01 -018	37744-0002	..PRINTER ASSY			1	D
01 -019	30470-0007	..RUNNING SPARES			1	C
01 -020	37742-0002	..CHASSIS ASSY			1	A
01 -020	37743-0002	..CHASSIS ASSY			1	F
01 -021	37739	..PLATE IDENT			1	A
01 -021	37738	..PLATE IDENT			1	B
01 -021	38263	..PLATE IDENT			1	D
		- - - AP - - -				
01 -022	05007-0024	..SCREW MACHINE			4	C
		- - - * - - -				
01 -023	37740-0002	..CASE ASSEMBLY			1	C

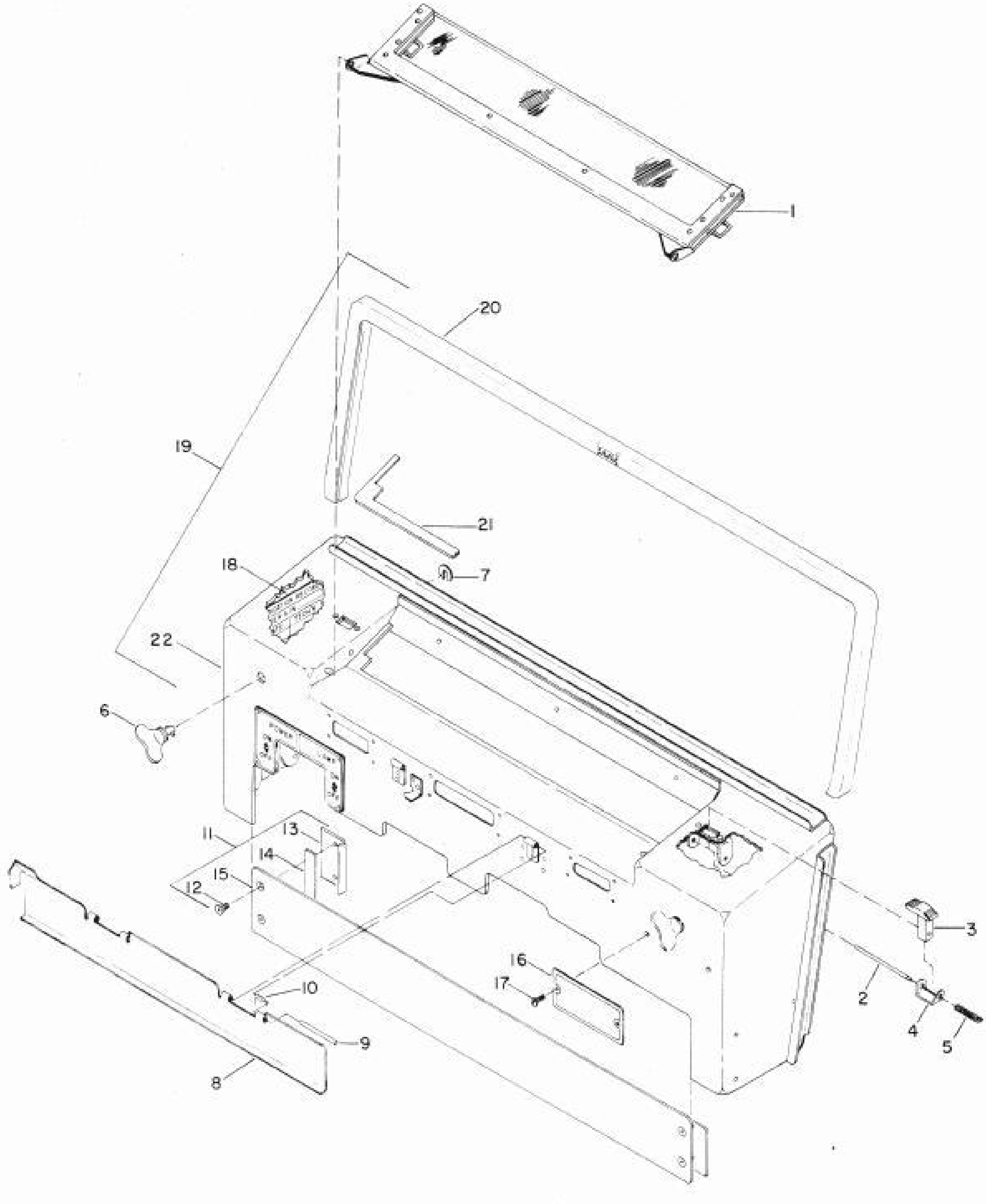


Figure 2. Front Cover Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		FRONT COVER ASSEMBLY		
02 -000	37741-0003	..COVER ASSY	REF	A
02 -000	37741-0004	..COVER ASSY	REF	F
02 -001	03356-0001	...WINDOW ASSY	1	C
02 -002	03359	...RELEASE ROD	2	C
02 -003	03369	...BUTTON RELEASE	2	C
02 -004	04563	...LOCK	2	C
02 -005	03387	...SPRING COMP	2	C
02 -006	05082-0001	...STUD	2	C
02 -007	04149	...WASHER	2	C
02 -008	03625-0001	...REFLECTOR	1	A
02 -009	03628	...HINGE PIN	2	A
02 -010	03629	...SPRING	2	A
02 -011	22214-0001	...COVER PL ASSY	1	F
		- - - AP - - -		
02 -012	05019-0006	...SCREW MACHINE	4	F
02 -013	22201	...CLAMP	2	F
		- - - * - - -		
02 -014	03399	....DUST SEAL	2	F
02 -015	22200-0001	....PLATE COVER	1	F
02 -016	38476-0002	...PLATE IDENT	1	A
02 -016	38476-0001	...PLATE IDENT	1	F
		- - - AP - - -		
02 -017	05007-0056	...SCREW MACHINE	2	C
		- - - * - - -		
02 -018	30899	...LABEL RECORD	1	C
02 -019	38143-0001	...FR COV BOND ASSY	1	A
02 -019	38143-0002	...FR COV BOND ASSY	1	F
02 -020	03395	....SEAL DUST	1	C
02 -021	03357	....GASKET	1	C
02 -022	37497-0001	....FR COVER ASSY	1	A
02 -022	37497-0002	....FR COVER ASSY	1	F

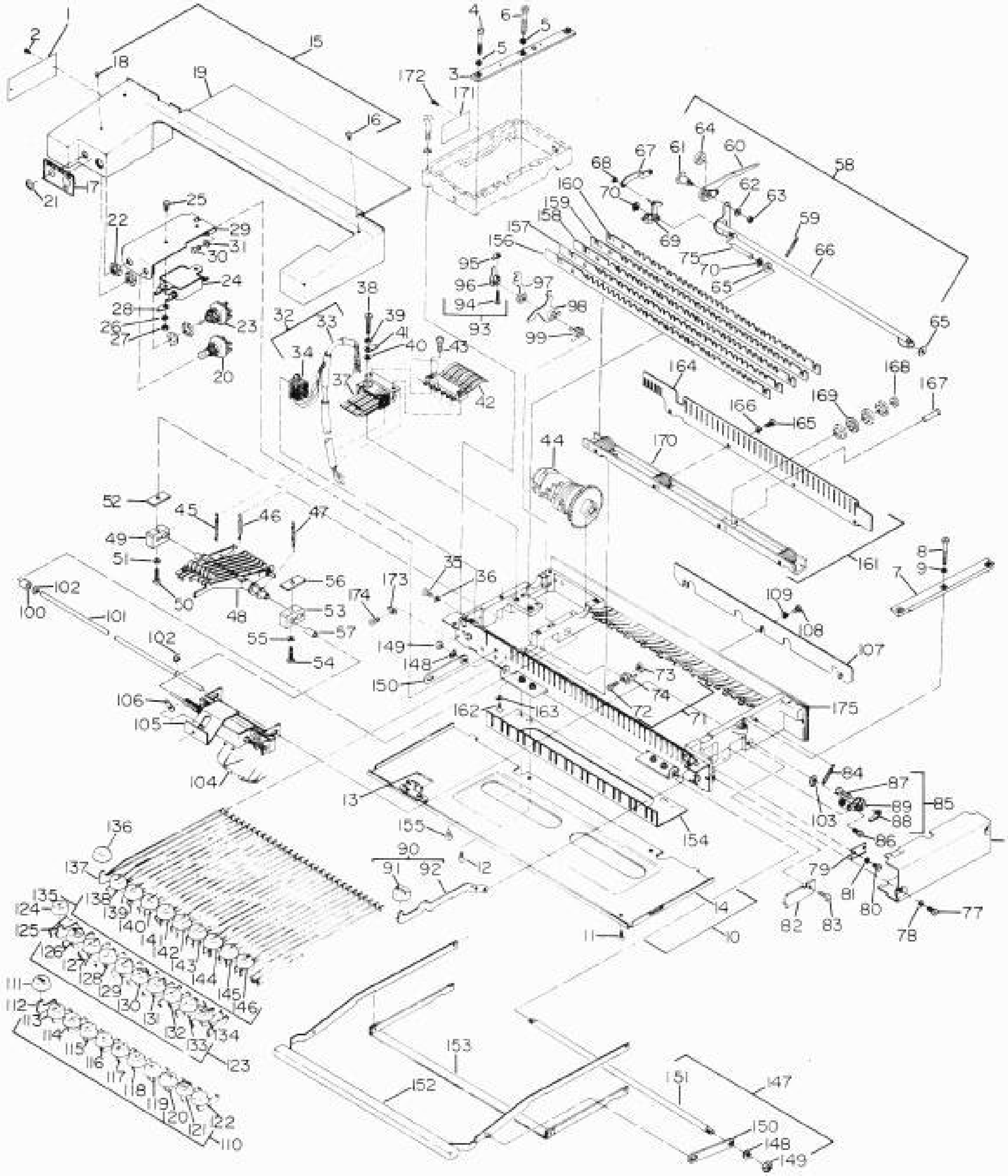


Figure 3. Keyboard Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
		KEYBOARD ASSEMBLY				
03 -000	37948	..KEYBOARD ASSY			REF	A
03 -001	03567-0011	...NAMEPLATE			1	A
		- - - AP - - -				
03 -002	05020-0001	...SCREW DRIVE			2	A
		- - - * - - -				
03 -003	38144	...RAIL LH			1	A
		- - - AP - - -				
03 -004	05007-0013	...SCREW MACHINE			1	A
03 -005	AN935-4L	...WASHER LOCK	05006-0004	88044	3	A
03 -006	05007-0017	...SCREW MACHINE			2	A
		- - - * - - -				
03 -007	38145	...RAIL RH			1	A
		- - - AP - - -				
03 -008	05007-0017	...SCREW MACHINE			3	A
03 -009	AN935-4L	...WASHER LOCK	05006-0004	88044	3	A
		- - - * - - -				
03 -010	04661-0001	...GUARD LEVER ASSY			1	A
		- - - AP - - -				
03 -011	05007-0006	...SCREW MACHINE			2	A
03 -012	05007-0024	...SCREW MACHINE			2	A
		- - - * - - -				
03 -013	04606	....SPRING			1	A
03 -014	38008-0001	....GUARD SUB ASSY			1	A
03 -015	38642	...COVER ASSEMBLY			1	A
		- - - AP - - -				
03 -016	05007-0024	...SCREW MACHINE			2	A
		- - - * - - -				
03 -017	00769	...PLATE IDENT			1	A
03 -018	00960	....PAD			2	A
03 -019	38641	....COVER			1	A
03 -020	05581-0010	...SWITCH PUSH			1	A
		- - - AP - - -				
03 -021	05152-0001	...NUT			1	A
03 -022	00962	...NUT HEX			1	A
		- - - * - - -				
03 -023	05577-0048	...SWITCH TOGGLE			1	A
03 -024	00961	...FILTER			1	A
		- - - AP - - -				
03 -025	05007-0024	...SCREW MACHINE			2	A
03 -026	05006-0009	...WASHER LOCK			2	A
03 -027	05030-0003	...NUT HEX			2	A
		- - - * - - -				
03 -028	05516-0016	...LUG TERMINAL			2	A
03 -029	00940	...BRACKET			1	A
		- - - AP - - -				
03 -030	05007-0024	...SCREW MACHINE			2	A
03 -031	05006-0009	...WASHER LOCK			2	A
		- - - * - - -				
03 -032	33854	...HARNCCOMP ASSY			1	A
03 -033	33855	....WIRING HARNESS			1	A
03 -034	00971	....CONTACT ASSY			1	A
		- - - AP - - -				
03 -035	05007-0002	....SCREW MACHINE			2	A
03 -036	AN935-3L	....WASHER LOCK	05006-0003	88044	2	A
		- - - * - - -				
03 -037	00996	...CONTACT ASSY			1	A
		- - - AP - - -				
03 -038	05007-0001	...SCREW MACHINE			2	A
03 -039	05006-0009	...WASHER LOCK			2	A
03 -040	05032-0007	...WASHER FLAT			2	A
		- - - * - - -				
03 -041	05516-0016	...LUG TERMINAL			1	A
03 -042	00990	...CONTACT ASSY			1	A
		- - - AP - - -				
03 -043	05007-0079	...SCREW MACHINE			2	A
		- - - * - - -				
03 -044	30617	...CAM ASSY			1	A
03 -045	30286	...SPRING			1	A
03 -046	00734	...SPRING			7	A

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
03 -047	00731	...SPRING	1	A
03 -048	30612	...LEVER ASSY	1	A
		- - - AP - - -		
03 -049	00776	...CLAMP SHAFT	1	A
03 -050	05007-0085	...SCREW MACHINE	1	A
03 -051	AN935-4L	...WASHER LOCK 05006-0004 88044	3	A
03 -052	00951	...SHIM CLAMP	1	A
		- - - AP - - -		
03 -053	30506	...CLAMP SHAFT	1	A
03 -054	05007-0085	...SCREW MACHINE	1	A
03 -055	AM935-4L	...WASHER LOCK 05006-0004 88044	8	
03 -056	00951	...SHIM CLAMP	1	A
03 -057	30507	...BUSHING	1	A
03 -058	00205	...REL ASSY	1	A
03 -059	30502	...SPRING	1	A
03 -060	00616	....CAM FOLLOWER	1	A
03 -061	00899	....ECCENTRIC	1	A
03 -062	05032-0007	....WASHER FLAT	1	A
03 -063	50 FA 440	....LOCKNUT 05016-0002 56878	1	A
03 -064	03660	....WASHER FELT	1	A
03 -065	03662	...WASHER FELT	2	A
03 -066	00632	....BAIL ASSY	1	A
03 -067	30509	...LINK LEVER	1	A
03 -068	5133-9	...RET RING 05004-0011 79136	4	A
03 -069	30513	...LEVER ASSY	1	A
03 -070	05004-0003	...RET RING	2	A
03 -071	30821	...SOLENOIDSTOP	1	A
03 -072	05007-0089	....SCREW MACHINE	1	A
03 -073	00824	....NUT ANTI TURN	1	A
03 -074	30614	....STOP	1	A
03 -075	30515	...SHAFT	1	A
03 -076	00946	...COVER RH	1	A
		- - - AP - - -		
03 -077	05007-0024	...SCREW MACHINE	2	A
03 -078	AN935-4L	...WASHER LOCK 05006-0004 88044	2	A
		- - - * - - -		
03 -079	00847	...GUIDEBAR RH	1	A
		- - - AP - - -		
03 -080	05007-0024	...SCREW MACHINE	2	A
03 -081	05006-0009	...WASHER LOCK	2	A
		- - - * - - -		
03 -082	30671	...REPEAT KEY STOP	1	A
		- - - AP - - -		
03 -083	05007-0024	...SCREW MACHINE	1	A
		- - - * - - -		
03 -084	00731	...SPRING	1	A
03 -085	00204	...CLAMP NUT ASSY	1	A
		- - - AP - - -		
03 -086	05007-0024	...SCREW MACHINE	2	A
		- - - * - - -		
03 -087	05007-0032	....SCREW MACHINE	1	A
03 -088	00958	....NUT ANTI TURN	1	A
03 -089	00956	....CLAMP REP ASSY	1	A
03 -090	00835	...KEY ASSY	1	A
03 -091	00891	....REPEAT KEYTOP	1	A
03 -092	00649	....KEY LEVER	1	A
03 -093	30620	...ARM ASSY	1	A
03 -094	05007-0089	....SCREW MACHINE	1	A
03 -095	00824	....NUT ANTI TURN	1	A
03 -096	30519	....ACTUATE ARM	1	A
03 -097	30514	...LEVER	1	A
03 -098	30516	...LEVER	1	A
03 -099	30508	...SPRING	1	A
03 -100	00936	...BUSHING	1	A
03 -101	00833	...SHAFT LEVER	1	A
03 -102	05004-0044	...RING RETAINING	2	A
03 -103	05004-0022	...RING RETAINING	1	A
03 -104	34289	...WIRE SHIELDED	1	A
03 -105	30615	...SOLENOID&BRKT	1	A
03 -106	05516-0016	...LUG TERMINAL	1	A
03 -107	00711	...KEY STRIP	1	A

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		- - - AP - - -		
03 -108	05007-0024	...SCREW MACHINE	3	A
03 -109	AN935-4L	...WASHER LOCK 05006-0004 88044	3	A
		- - - * - - -		
03 -110	00894	...KEY ASSY	1	A
03 -111	00880	....KEY TOP FIGS	1	A
03 -112	00854	....KEY LEVER	11	A
03 -113	00881	....KEY TOP Z	1	A
03 -114	00882	....KEYTOP X	1	A
03 -115	00883	....KEYTOP C	1	A
03 -116	00884	....KEYTOP V	1	A
03 -117	00885	....KEYTOP B	1	A
03 -118	00886	....KEYTOP N	1	A
03 -119	00887	....KEYTOP M	1	A
03 -120	00888	....KEYTOP LTRS	1	A
03 -121	00889	....KEYTOP LIN FEED	1	A
03 -122	00890	....KEYTOP BLANK	1	A
03 -123	00893	...KEY ASSY	1	A
03 -124	00870	....KEYTOP A	1	A
03 -125	00853	....KEY LEVER	10	A
03 -126	00871	....KEYTOP BELL S	1	A
03 -127	00872	....KEYTOP D	1	A
03 -128	00873	....KEYTOP F	1	A
03 -129	00874	....KEYTOP G	1	A
03 -130	00875	....KEYTOP H	1	A
03 -131	00876	....KEYTOP J	1	A
03 -132	00877	....KEYTOP K	1	A
03 -133	00878	....KEYTOP L	1	A
03 -134	00879	....KEYTOP CAR RET	1	A
03 -135	00892	...KEY ASSY	1	A
03 -136	00860	....KEYTOP 1 Q	1	A
03 -137	00852	....KEY LEVER	10	A
03 -138	00861	....KEYTOP 2 W	1	A
03 -139	00862	....KEYTOP 3 E	1	A
03 -140	00863	....KEYTOP 4 R	1	A
03 -141	00864	....KEYTOP 5 T	1	A
03 -142	00865	....KEYTOP 6 Y	1	A
03 -143	00866	....KEYTOP 7 U	1	A
03 -144	00867	....KEYTOP 8 I	1	A
03 -145	00868	....KEYTOP 9 O	1	A
03 -146	00869	....KEYTOP P	1	A
03 -147	00202	...SHAFT ASSY	1	A
03 -148	AN935-10L	....WASHER LOCK 05006-0012 88044	2	A
03 -149	05030-0006	....HEX NUT	2	A
03 -150	00726	....SPACE BAR	2	A
03 -151	00727	....SHAFT	1	A
03 -152	00674	...SPACE BAR ASSY	1	A
03 -153	00831	...PAD ASSY	1	A
03 -154	00941	...KEY GUIDE	1	A
		- - - AP - - -		
03 -155	05007-0024	...SCREW MACHINE	2	A
		- - - * - - -		
03 -156	00929	...CODE BAR	1	A
03 -157	00930	...CODE BAR	1	A
03 -158	00931	...CODE BAR	1	A
03 -159	00932	...CODE BAR	1	A
03 -160	00933	...CODE BAR	1	A
03 -161	30259	...BAR ASSY CODE	1	A
		- - - AP - - -		
03 -162	00944	...SCREW MACHINE	2	A
03 -163	05006-0009	...WASHER LOCK	2	A
		- - - * - - -		
03 -164	00713	....KEY GUIDE	1	A
		- - - AP - - -		
03 -165	05007-0182	....SCREW MACHINE	4	A
03 -166	AN935-4L	....WASHER LOCK 05006-0004 88044	4	A
		- - - * - - -		
03 -167	33696	....RIVET	4	A
03 -168	30050	....SPACER	4	A
03 -169	30048	....ROLLER	16	A
03 -170	34290	....CODE BAR ASSY	1	A
03 -171	38146	....NAME PLATE	1	A
03 -172	05020-0001	...SCREW DRIVE	2	A
03 -173	05016-0016	...LUG TERMINAL	1	A
03 -174	05007-0024	...SCREW MACHINE	1	A
03 -175	30623-0002	...FRAME ASSEMBLY	1	A

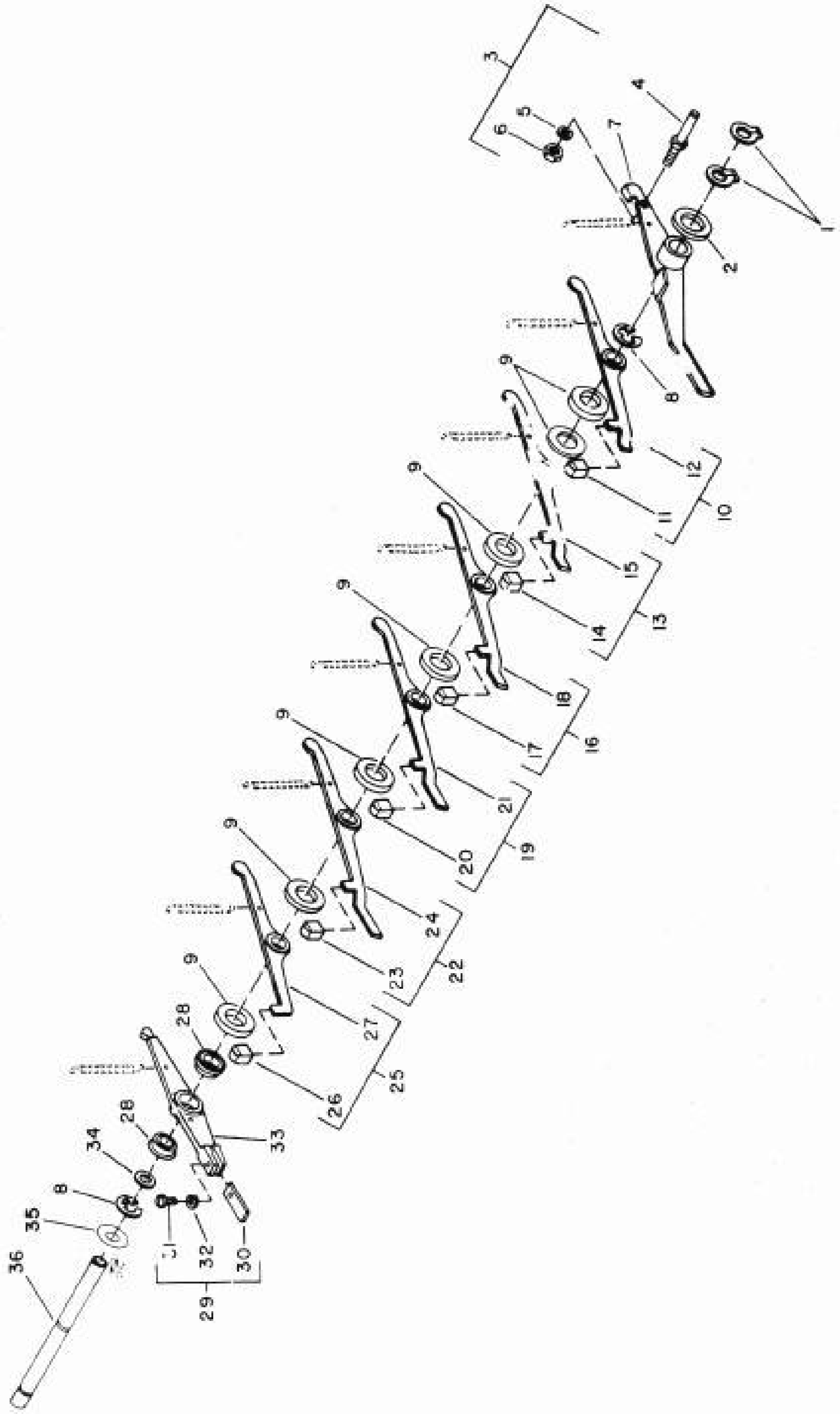


Figure 4. Keyboard Lever Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		KEYBOARD LEVER ASSEMBLY		
04 -000	30612	...LEVER ASSY	REF	A
04 -001	05004-0025	....RING RETAINING	2	A
04 -002	00724	....SPACER	1	A
04 -003	30517	....LEVER ASSY	1	A
04 -004	30504	.....ECCENTRIC PIN	1	A
04 -005	AN935-2L	.....WASHER LOCK 05006-0002 88044	1	A
04 -006	05030-0002	.....NUT HEX	1	A
04 -007	30897	.....PREVENTLEVERASY	1	A
04 -008	05004-0022	....RING RETAINING	2	A
04 -009	03657	....WASHER FELT	7	A
04 -010	00810	....FINGER ASSEMBLY	1	A
04 -011	00610	.....PUSHER	1	A
04 -012	04837	.....SPIN ASSY	1	A
04 -013	00809	....FINGER ASSEMBLY	1	A
04 -014	00610	.....PUSHER	1	A
04 -015	04838	.....SPIN ASSY	1	A
04 -016	00808	....FINGER ASSEMBLY	1	A
04 -017	00610	.....PUSHER	1	A
04 -018	04839	.....SPIN ASSY	1	A
04 -019	00807	....FINGER ASSEMBLY	1	A
04 -020	00610	.....PUSHER	1	A
04 -021	04840	.....SPIN ASSY	1	A
04 -022	00806	....FINGER ASSEMBLY	1	A
04 -023	00610	.....PUSHER	1	A
04 -024	04841	.....SPIN ASSY	1	A
04 -025	00805	....FINGER ASSY	1	A
04 -026	00610	.....PUSHER	1	A
04 -027	04842	.....SPIN ASSY	1	A
04 -028	05012-0014	....BEARING	2	A
04 -029	00201	....FOLLOWER ASSY	1	A
04 -030	00738	.....ACTUATOR	1	A
		- - - AP - - -		
04 -031	05007-0042	.....SCREW MACHINE	1	A
04 -032	AN935-2L	.....WASHER LOCK 05006-0002 88044	1	A
		- - - * - - -		
04 -033	00811	.....CAM FOLLOWER	1	A
04 -034	00815	....SPACER	1	A
04 -035	04512	....SHIM	1	A
04 -036	00722	....SHAFT	1	A

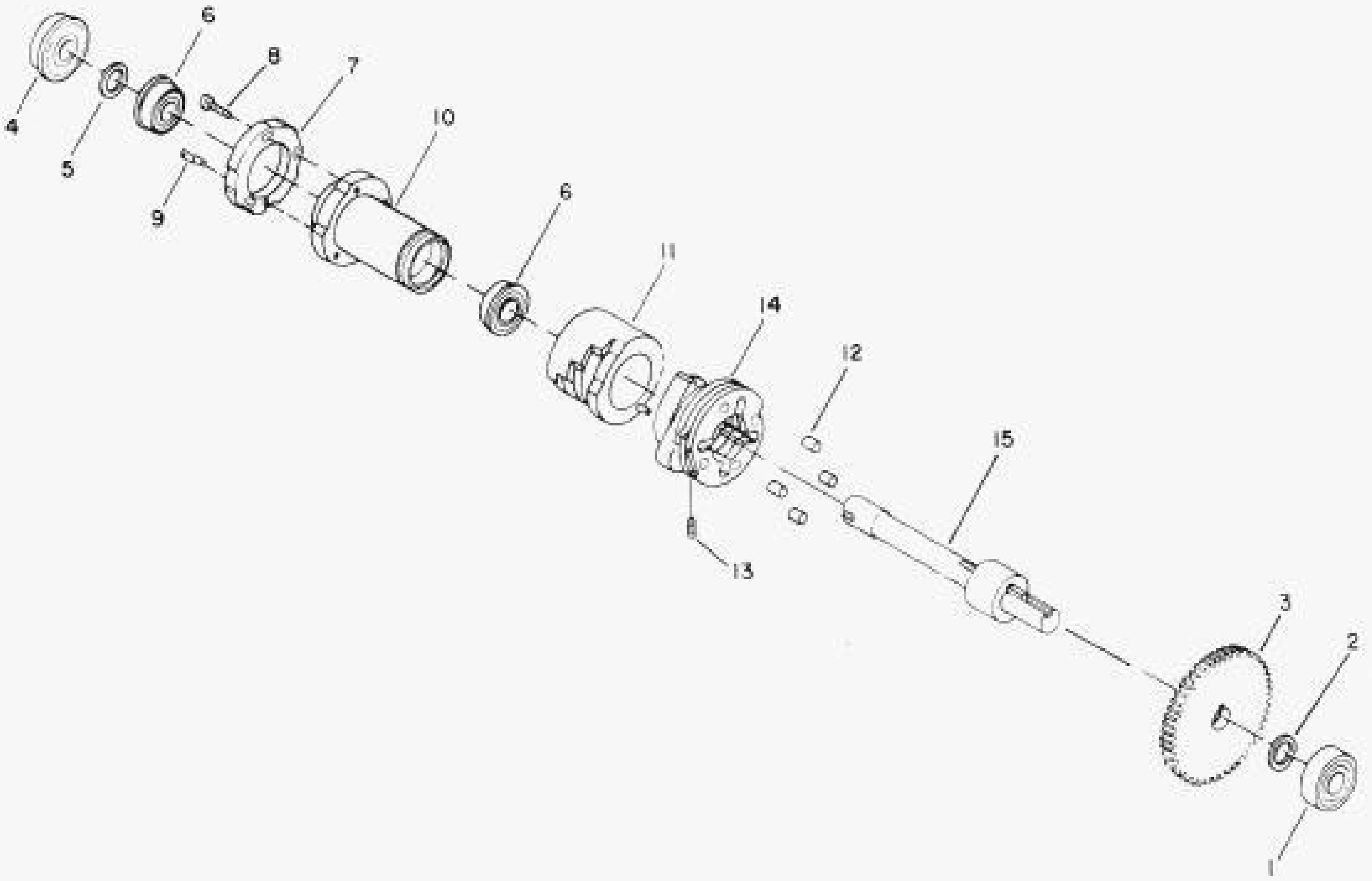


Figure 5. Keyboard Cam Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		KEYBOARD CAM ASSEMBLY		
05 -000	30617	...CAM ASSY	REF	A
05 -001	05012-0029	....BEARING	1	A
05 -002	00660	....SPACER	1	A
05 -003	00648	....GEAR	1	A
05 -004	05012-0001	....BEARING	1	A
05 -005	00660	....SPACER	1	A
05 -006	05012-0015	....BEARING	2	A
05 -007	30611	....PULSING CAM	1	A
05 -008	05072-0003	....SCREW MACHINE	3	A
05 -009	00677	....ECCENTRIC	1	A
05 -010	00655	....CAM BUSHING	1	A
05 -011	00855	....CAM ASSY	1	A
05 -012	01205-0001	....CLUTCH ROLLER	4	A
05 -013	05079-0001	....SETSCREW	2	A
05 -014	00656	....CLUTCH ASSY	1	A
05 -015	00625	....SHAFT ASSY	1	A

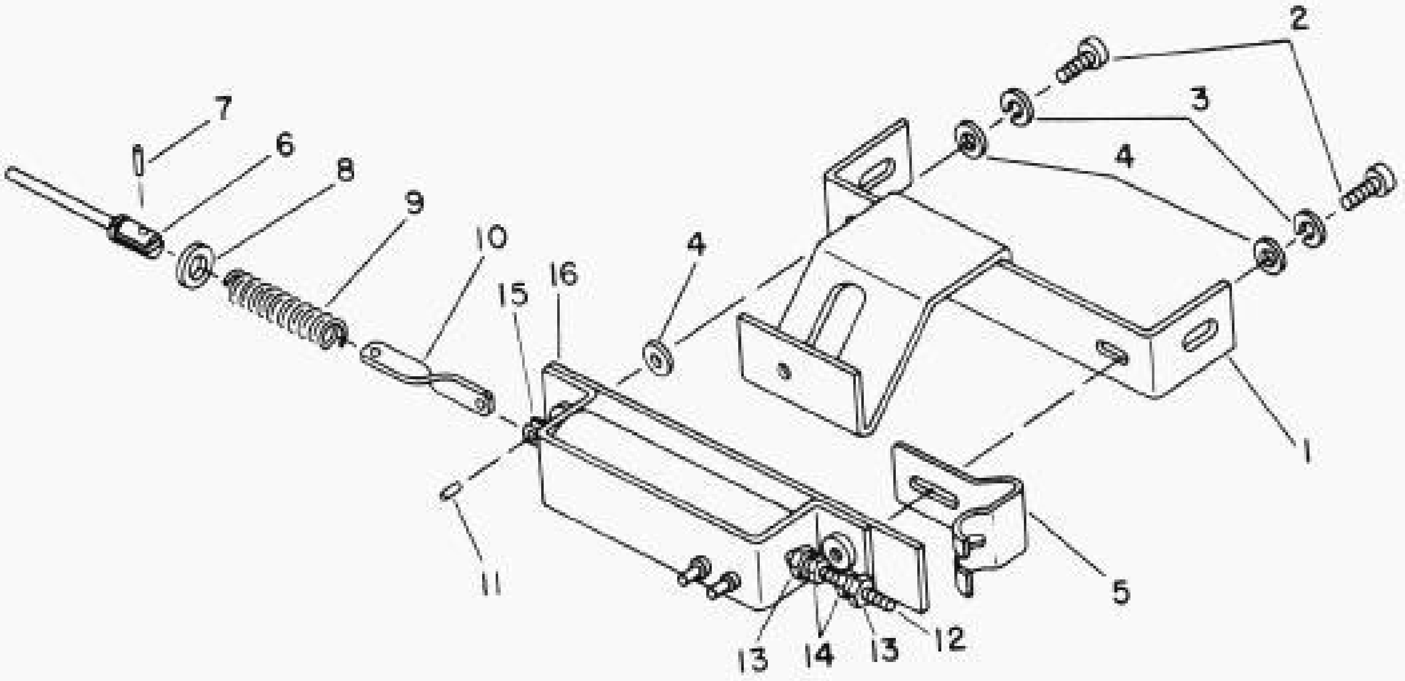


Figure 6. Keyboard Solenoid and Bracket Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
		KEYBOARD SOLENOID AND BRACKET ASSEM				
06 -000	30615	...SOLENOIDEBRKT			REF	A
06 -001	30593	....BRACKET MTG			1	A
		- - - AP - - -				
06 -002	05007-0211	....SCREW MACHINE			2	A
06 -003	AN935-4L	....WASHER LOCK	05006-0004	88044	2	A
06 -004	05032-0004	....WASHER FLAT			2	A
		- - - * - - -				
06 -005	30594	....SPRING LEAF			1	A
06 -006	30592	....PIN RELEASE			1	A
06 -007	05017-0004	....PIN GROOVED			1	A
06 -008	05032-0020	....WASHER FLAT			1	A
06 -009	30595	....SPRING			1	A
06 -010	30590	....LINK			1	A
06 -011	05017-0004	....SPIROL PIN			1	A
06 -012	30784	....ROD ADJ			1	A
06 -013	05016-0018	....NUT HEX LKG			2	A
06 -014	05030-0002	....HEX NUT			2	A
06 -015	30783	....PLUNGER			1	A
06 -016	30613	....SOLENOID			1	A

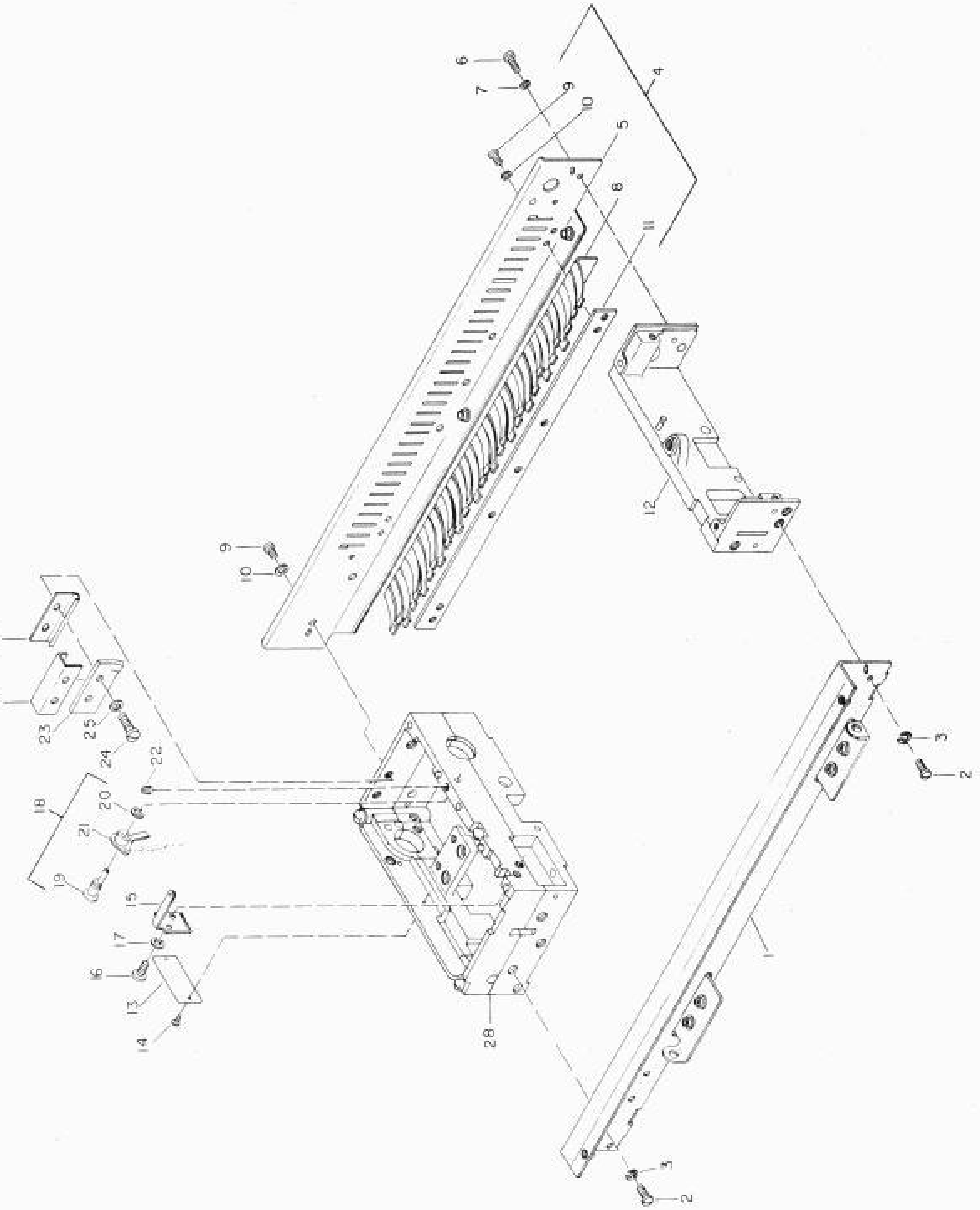


Figure 7. Keyboard Frame Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		KEYBOARD FRAME ASSEMBLY		
07 -000	30623-0002	...FRAME ASSY	REF	A
07 -001	00750	....FRAME SUPT ASSY	1	A
		- - - AP - - -		
07 -002	05007-0024	....SCREW	2	A
07 -003	05006-0009	....WASHER LOCK	2	A
		- - - * - - -		
07 -004	00203	....SPRING ASSY	1	A
07 -005	00963	.....KEY BD FRAME AS	1	A
		- - - AP - - -		
07 -006	05007-0024	....SCREW MACHINE	2	A
07 -007	05006-0009	....WASHER LOCK	2	A
		- - - * - - -		
07 -008	00630	.....LEAF SPRING	1	A
		- - - AP - - -		
07 -009	05007-0024	.....SCREW MACHINE	3	A
07 -010	05006-0009	.....WASHER LOCK	3	A
		- - - * - - -		
07 -011	00710	.....MOUNTING STRIP	1	A
07 -012	00775	....FRAME ASSY RH	1	A
07 -013	30624	....PLATE IDENT	1	A
		- - - AP - - -		
07 -014	05020-0001	....SCREW DRIVE	2	A
		- - - * - - -		
07 -015	00791	....CODE BAR LH	1	A
		- - - AP - - -		
07 -016	05007-0024	....SCREW MACHINE	2	A
07 -017	05006-0009	....WASHER LOCK	2	A
		- - - * - - -		
07 -018	00983	....SHAFT ASSY	1	A
07 -019	00725	.....SHAFT	1	A
07 -020	05004-0018	.....RING RETAINING	1	A
07 -021	00819	.....BACKSTOP ASSY	1	A
		- - - AP - - -		
07 -022	05009-0006	...SETSCREW	1	A
		- - - * - - -		
07 -023	03805	....WICK CAM	1	A
		- - - AP - - -		
07 -024	05007-0016	....SCREW MACHINE	2	A
07 -025	05006-0009	....WASHER LOCK	2	A
		- - - * - - -		
07 -026	03804	....PLATE CAM WICK	1	A
07 -027	03806	....BRKT CAM WICK	1	A
07 -028	33857	....FRAME ASSY LH	1	A

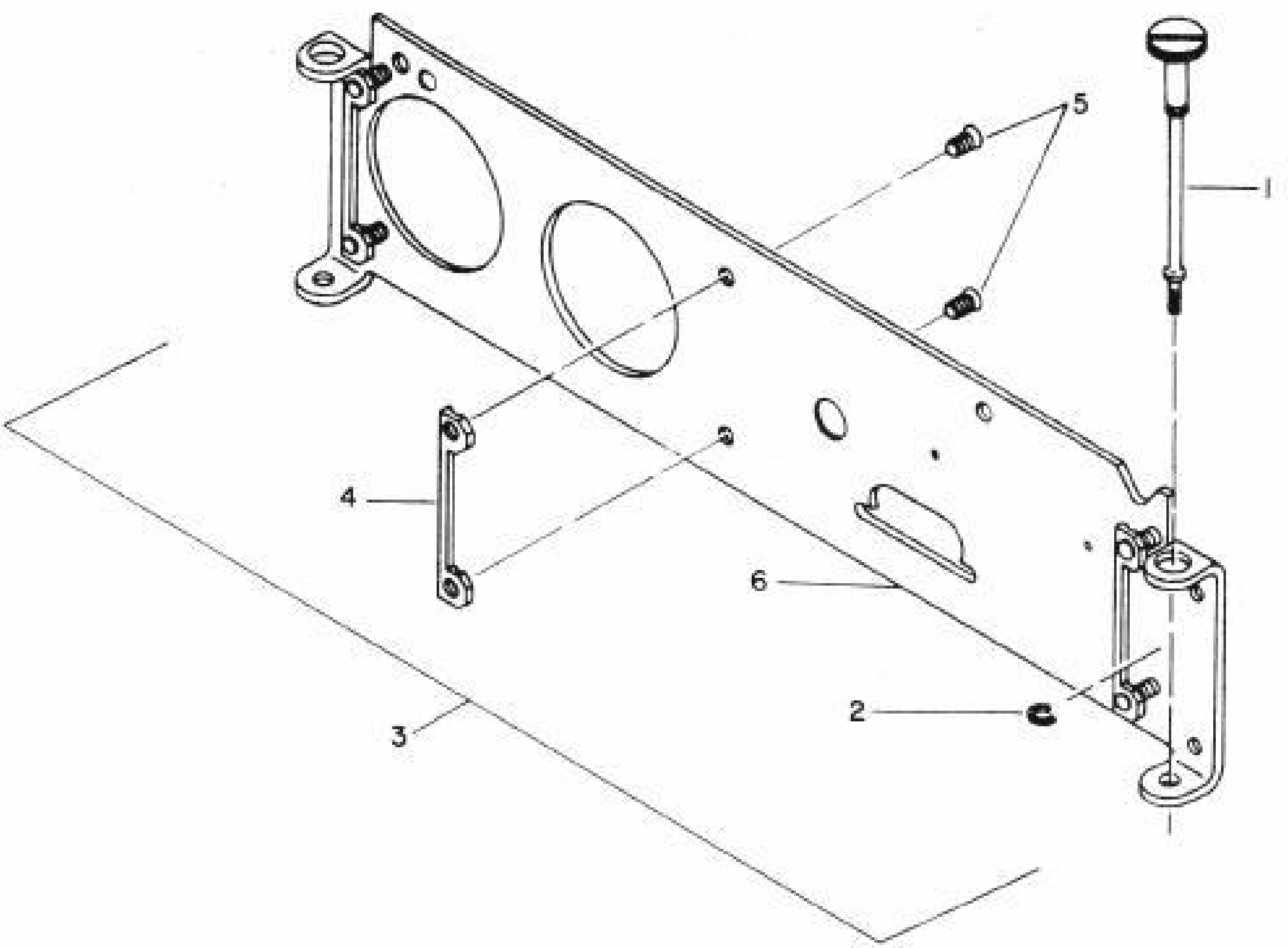


Figure 8. Back Plate Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		BACK PLATE ASSEMBLY		
08 -000	01965-0002	..PLATE ASSY	REF	C
08 -001	01969	...SCREW MACHINE	2	C
08 -002	05004-0015	...RING RETAINING	2	C
08 -003	04811-0002	....PLATE ASSY	1	C
08 -004	01885	.....CLAMP BACK PL	3	C
08 -005	05007-0009	.....SCREW MACHINE	6	C
08 -006	01884-0002	.....PLATE	1	C
		MOTOR & FAN HOUSING ASSEMBLY		
09 -000	34258-0002	..MOT&FAN HSGASY	REF	C
09 -001	33025-0002	...DUCTS ASSEMBLY	1	C
09 -002	05007-0075	...SCREW MACHINE	2	C
09 -003	03417	...FAN HSG ASSY	1	C
09 -004	03056-0002	...MOTOR HSG ASSY	1	C
09 -005	26786	...LOCKNUT	1	C
09 -006	02533	...GEAR 100 WPM	1	C
09 -007	02538-0003	...MOT MTG PL ASSY	1	C
09 -008	03755	...SCREW MACHINE	3	C
09 -009	05006-0006	...WASHER LOCK	3	C
09 -010	04723	...PLATE ASSY MTG	1	C
09 -011	05007-0061	....SCREW MACHINE	3	C
09 -012	AN935-4L	....WASHER LOCK 05006-0004 88044	3	A
09 -013	05070-0001	...GROOVE PIN	1	C
09 -014	01175	...GEAR REDUCTION	1	C
09 -015	05012-0028	...BEARING	2	C
09 -016	02485	...MOTOR ASSY	1	C
09 -017	38767	....FAN ASSY	1	C
09 -018	05009-0006	....SETSCREW	1	C
09 -019	05511-0131	....CONNECTOR	1	C
09 -020	02843	....LOCK CONNECTOR	2	C
09 -021	05539-0009	....HOOD CONNECTOR	1	C
09 -022	03423	....NAME PLATE	1	C
09 -023	03416	....MOT & CONN ASSY	1	C

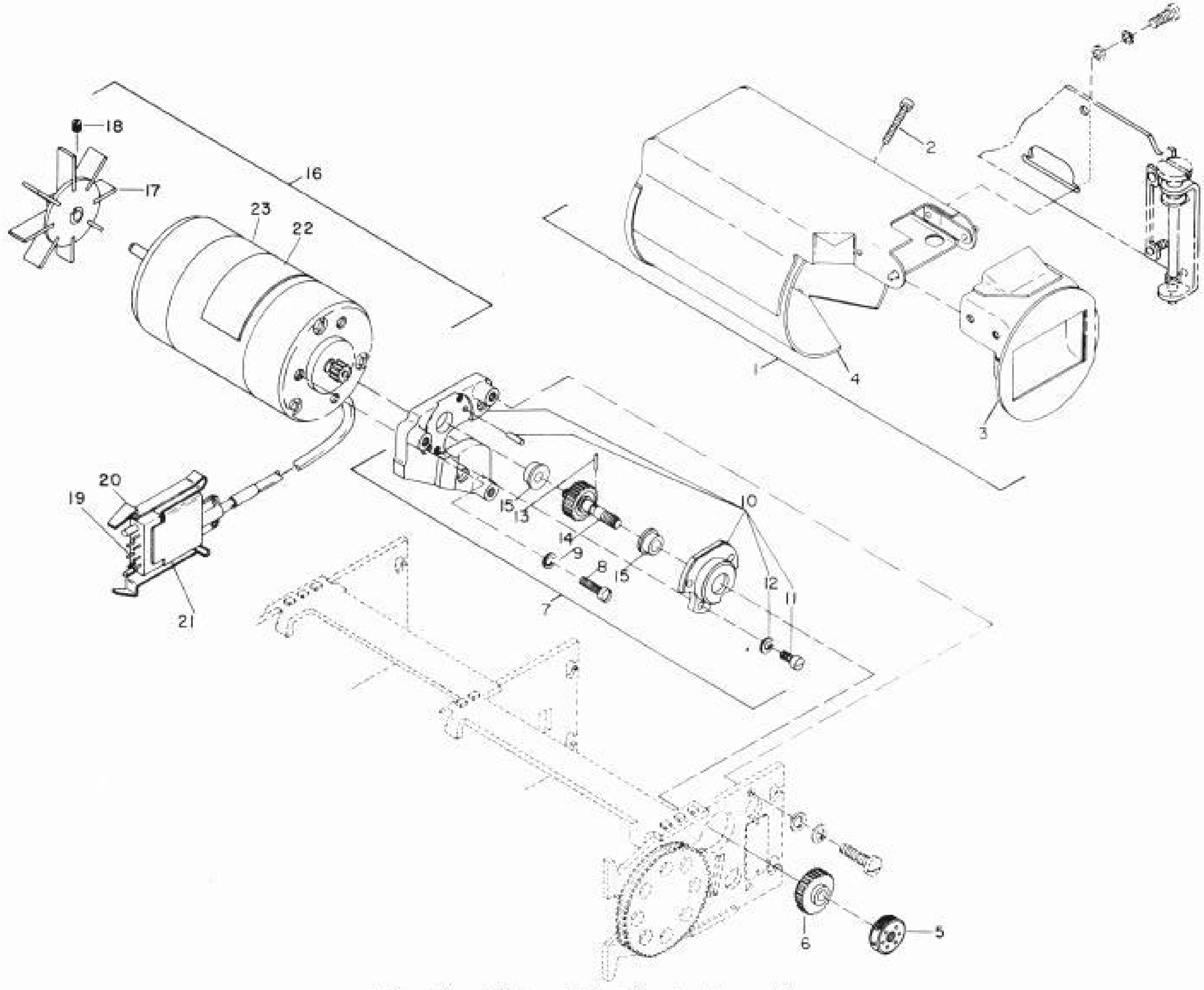


Figure 9. Motor and Fan Housing Assembly

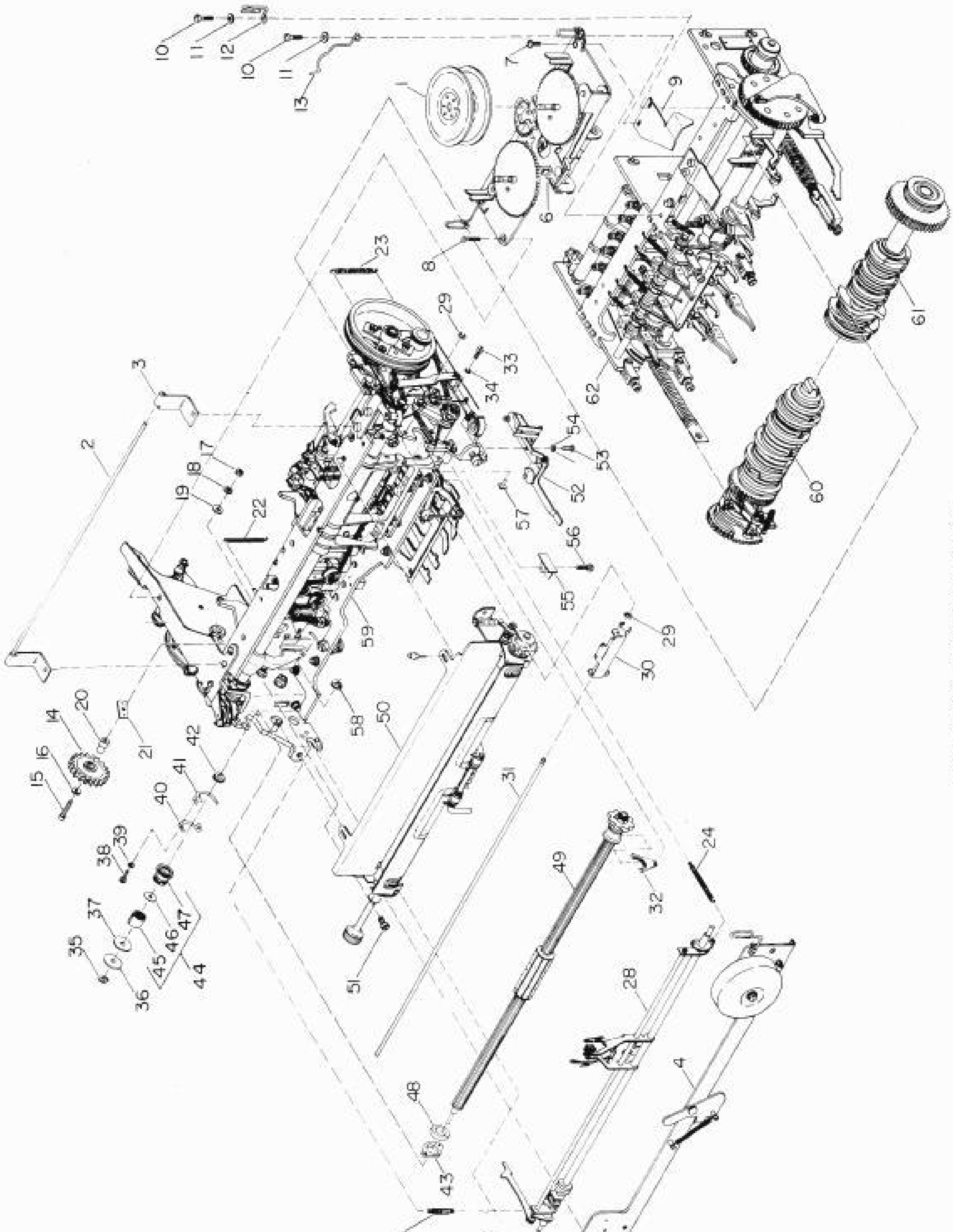


Figure 10. Printer Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
10 -051	05008-0008	...SCREW MACHINE			2	C
		- - - * - - -				
10 -052	38262	...LINE FEED ASSY			1	C
		- - - AP - - -				
10 -053	05007-0033	...SCREW MACHINE			3	C
10 -054	AN935-4L	...WASHER LOCK	05006-0004	88044	3	C
		- - - * - - -				
10 -055	33863	...PLATE ASSY			1	C
		- - - AP - - -				
10 -056	05007-0140	...SCREW MACHINE			1	C
		- - - * - - -				
10 -057	33864	...PIN			1	C
10 -058	5144-22	...RING RETAINING	05004-0029	79136	1	C
10 -059	37735	...FRONT SECTION			1	C
10 -060	33131-0003	...SELECT MAIN SHF			1	A
10 -060	33131-0002	...SELECT MAIN SHF			1	F
10 -061	33032	...FUNCT MAIN SHFT			1	C
10 -062	37736-0003	...REAR SECT ASSY			1	A
10 -062	37736-0001	...REAR SECT ASSY			1	B
10 -062	37736-0002	...REAR SECT ASSY			1	D

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
		PRINTER ASSEMBLY				
10 -000	37744-0003	..PRINTER ASSY			REF	A
10 -000	37744-0001	..PRINTER ASSY			REF	B
10 -000	37744-0002	..PRINTER ASSY			REF	D
10 -001	05047-0001	...RIBBON SPOOL			1	C
10 -002	38649	...ROD BRKT ASSY			1	C
10 -003	38646	...BRKT RH			1	C
10 -004	38164	...PL ASSY FRONT			1	C
		- - - AP - - -				
10 -005	05007-0005	...SCREW MACHINE			2	C
		- - - * - - -				
10 -006	36594	...RIBBON FEED ASSY			1	C
		- - - AP - - -				
10 -007	05007-0017	...SCREW			1	C
10 -008	05007-0049	...SCREW			1	C
		- - - * - - -				
10 -009	38141	...GUIDE			1	C
		- - - AP - - -				
10 -010	05007-0051	...SCREW			2	C
10 -011	05032-0006	...WASHER FLAT			2	C
		- - - * - - -				
10 -012	37528	...RIBBON GUIDE				C
10 -013	38849	...CABLE CLIP			1	C
10 -014	01501	...GEAR ASSY			1	A
		- - - AP - - -				
10 -015	05019-0012	...SCREW MACHINE			1	A
10 -016	33813	...WASHER			1	A
10 -017	05030-0010	...NUT HEX			1	A
10 -018	05032-0029	...WASHER FLAT			1	A
10 -019	05006-0009	...WASHER LOCK			1	A
		- - - * - - -				
10 -020	38434	...BUSHING			1	A
10 -021	33810	...PLATE			1	A
10 -022	04260	...SPRING			1	A
10 -023	38112	...SPRING			1	C
10 -024	01802	...SPRING			1	C
10 -025	01800	...SPRING			1	C
10 -026	05004-0022	...RING RETAINING			1	C
10 -027	37990	...BEARING			2	C
10 -028	38147	...HAM SHAFT ASSY			1	C
		- - - AP - - -				
10 -029	5133-9	...RING RETAINING	05004-0011	79136	2	C
		- - - * - - -				
10 -030	37831	...YOKE ASSY			1	C
10 -031	38013	...SHAFT			1	C
10 -032	38012	...BEARING RET			1	C
		- - - AP - - -				
10 -033	05007-0002	...SCREW MACHINE			1	C
10 -034	1203-00	...WASHER	05006-0008	78189	1	C
		- - - * - - -				
10 -035	05004-0003	...RING RETAINING			1	C
10 -036	02783	...WASHER			1	C
10 -037	01402	...WASHER			1	C
10 -038	05008-0052	...SOC HD CAP SCR			2	C
10 -039	1202-00	...WASHER LOCK	05006-0007	78189	2	C
10 -040	38010	...CLAMP UPPER			1	C
10 -041	38009	...CLAMP LOWER			1	C
10 -042	05012-0070	...BEARING			1	C
10 -043	38027	...THREAD FLANGE			1	C
10 -044	38093	...SPRING RET ASSY			1	C
10 -045	01261	....SPIRAL SPRING			1	C
10 -046	02005	....WASHER			1	C
10 -047	38011	....SPRING RET			1	C
10 -048	37432	...WASHER FELT			1	C
10 -049	38094-0002	...CYL SHAFT ASSY			1	D
10 -049	38094-0001	...CYL SHAFT ASSY			1	E
10 -050	30400-[illegible]1	...PAPER FEED ASSY			1	C
		- - - AP - - -				

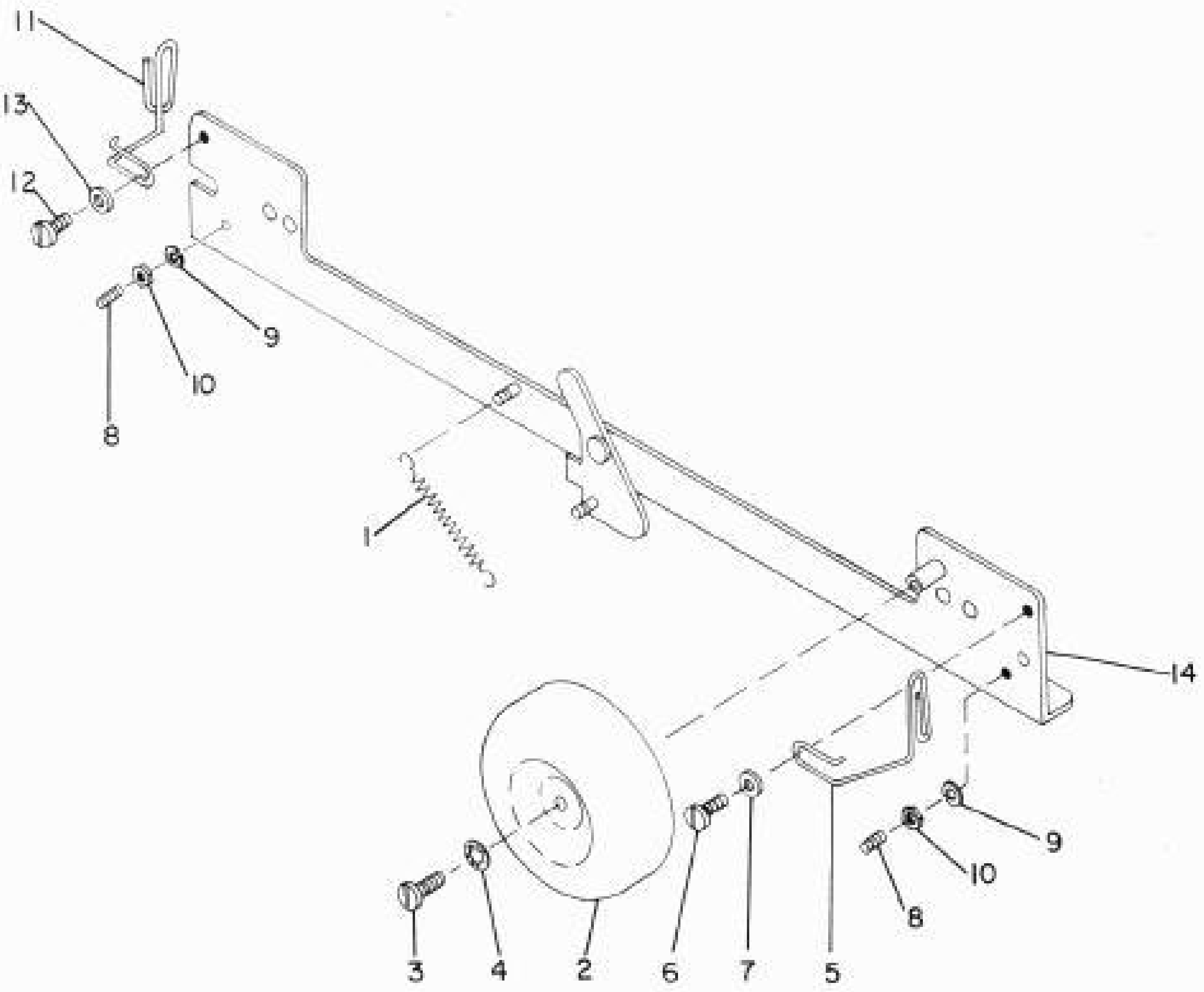


Figure 11. Front Plate Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		FRONT PLATE ASSEMBLY		
11 -000	38164	...PL ASSY FRONT	REF	C
11 -001	00736	....SPRING	1	C
11 -002	03038	....BELL	1	C
		- - - AP - - -		
11 -003	05007-0038	....SCREW MACHINE	1	C
11 -004	05006-0009	....WASHER LOCK	1	C
		- - - * - - -		
11 -005	38162	....GUIDE RH	1	C
		- - - AP - - -		
11 -006	05007-0024	....SCREW MACHINE	1	C
11 -007	05032-0005	....WASHER FLAT	1	C
		- - - * - - -		
11 -008	05009-0053	....SETSCREW	2	C
11 -009	[illegible]	....WASHER LOCK 05006-0004 [illegible]	2	C
11 -010	05030-0010	....NUT HEX	2	C
11 -011	38163	....GUIDE LH	1	C
		- - - AP - - -		
11 -012	05007-0024	....SCREW MACHINE	2	C
11 -013	05032-0005	....WASHER FLAT	2	C
		- - - * - - -		
11 -014	37993	....PLATE	1	C

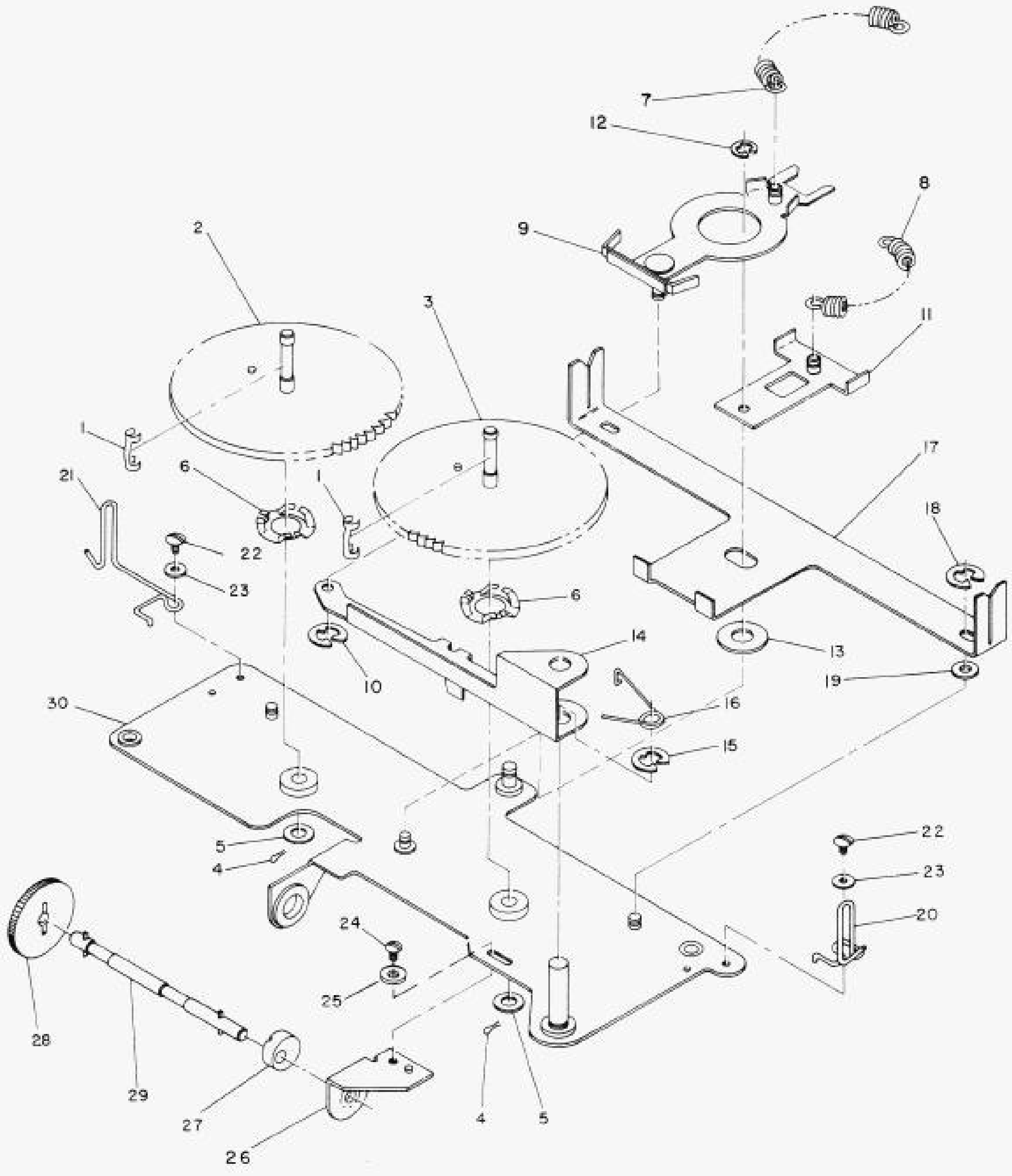


Figure 12. Ribbon Feed Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		RIBBON FEED ASSEMBLY		
12 -000	36594	...RIBBON FEEDASSY	REF	C
12 -001	03261	....CLIP	2	C
12 -002	38085	....SPINDLE LH	1	C
12 -003	38084	....SPINDLE RH	1	C
		- - - AP - - -		
12 -004	05180-0001	....PIN COTTER	2	C
12 -005	37594	....WASHER	2	C
12 -006	38847	....SPRING WASHER	2	C
		- - - * - - -		
12 -007	36603	....SPG DRIVE PAWL	1	C
12 -008	36604	....SPG CHECK PAWL	1	C
12 -009	37964	....DRIVE PAWLASSY	1	C
		- - - AP - - -		
12 -010	5133-12	....RING RETAINING 05004-0019 79136	1	C
		- - - * - - -		
12 -011	36606	....CHECK PAWLASSY	1	C
		- - - AP - - -		
12 -012	5133-9	....RING RETAINING 05004-0011 79136	1	C
12 -013	36665	....WASHER	1	C
		- - - * - - -		
12 -014	36601	....POWER LEVER	1	C
		- - - AP - - -		
12 -015	05004-0022	....RING RETAINING	1	C
		- - - * - - -		
12 -016	37834	....SPRING	1	C
12 -017	36615	....BAR REVERSE	1	C
		- - - AP - - -		
12 -018	5133-12	....RING RETAINING 05004-0019 79136	2	C
		- - - * - - -		
12 -019	37594	....SHIM	2	C
12 -020	36616	....RIBBON GUIDE RH	1	C
12 -021	36598	....RIBBON-GUIDE LH	1	C
		- - - AP - - -		
12 -022	05007-0024	....SCREW MACHINE	2	C
12 -023	05032-0005	....WASHER	2	C
		- - - * - - -		
12 -024	05007-0024	....SCREW MACHINE	1	C
12 -025	05032-0007	....WASHER FLAT	1	C
12 -026	36667	....BRACKET ASSY	1	C
12 -027	36612	....CAM	1	C
12 -028	36610	....GEAR DRIVE	1	C
12 -029	38030	....SHAFT ASSY	1	C
12 -030	36602	....PLATE ASSY	1	C

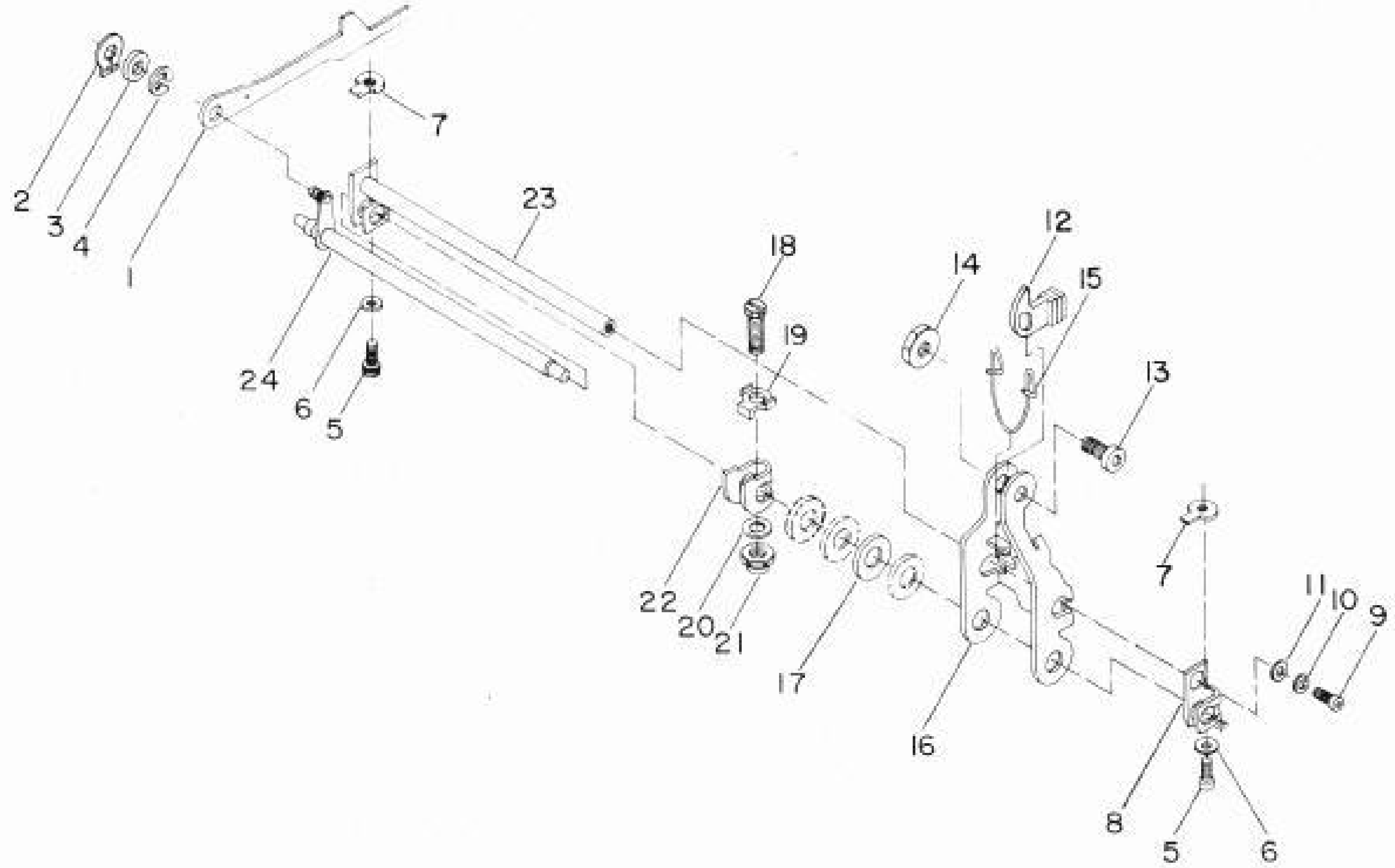


Figure 13. Hammer Shaft Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		HAMMER SHAFT ASSEMBLY		
13 -000	38147	...SHAFT ASSY	REF	C
13 -001	01262	....ACTUATOR LINK	1	C
		- - - AP - - -		
13 -002	05004-0003	....RING RETAINING	1	C
		- - - * - - -		
13 -003	03662	....FELT WASHER	1	C
13 -004	05004-0029	....RING RETAINING	1	C
13 -005	05008-0015	....SCREW MACHINE	2	C
13 -006	05032-0007	....WASHER FLAT	2	C
13 -007	00824	....NUT ANTI TURN	2	C
13 -008	38000	....BRACKET RH	1	C
		- - - AP - - -		
13 -009	05008-0008	....SCREW MACHINE	1	C
13 -010	AN935-4L	....WASHER LOCK 05006-0004 88044	1	C
13 -011	05032-0007	....WASHER FLAT	1	C
		- - - * - - -		
13 -012	01253	....PAD ASSY	1	C
		- - - AP - - -		
13 -013	05008-0013	....SETSCREW	1	C
13 -014	05030-0003	....NUT HEX	1	C
		- - - * - - -		
13 -015	36592	....SPRING RIBBON	1	C
13 -016	38148	....HAMMER	1	C
13 -017	36579	....WASHER FELT	4	C
13 -018	05007-0206	....SCREW MACHINE	1	C
13 -019	02009	....WASHER LOCK	1	C
13 -020	05032-0007	....WASHER FLAT	1	C
13 -021	50 FA 440	....LOCKNUT 05016-0002 56878	1	C
13 -022	36573	....STOP	1	C
13 -023	38096	....BRACKET ASSY	1	C
13 -024	36581	....SHAFT ASSY	1	C

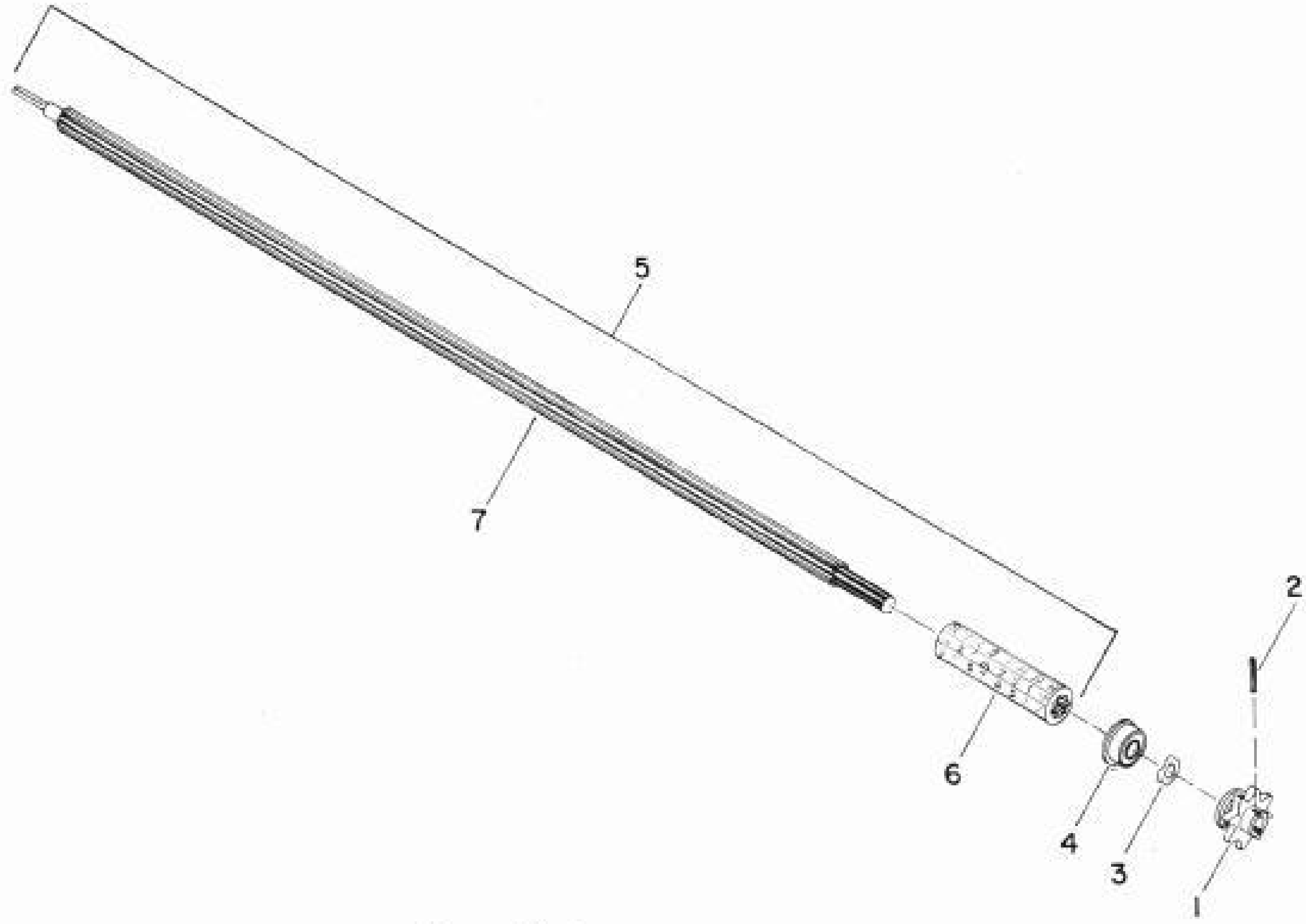


Figure 14. Cylinder and Shaft Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		CYLINDER AND SHAFT ASSEMBLY		
14 -000	38094-0002	...SHAFT ASSY	REF	D
14 -000	38094-0001	...SHAFT ASSY	REF	E
14 -001	38014	....INDEX WHEEL	1	C
14 -002	05080-0020	....PIN	1	C
14 -003	05077-0022	....SPRING WASHER	1	C
14 -004	05012-0048	....BEARING	1	C
14 -005	38095-0002	....SHAFT ASSY	1	D
14 -005	38095-0001	....CYL SHAFT ASSY	1	F
14 -006	38074	.....CYL ASSYWEATHER	1	D
14 -006	38073	.....CYL ASSY COMM	1	E
14 -007	38019	.....CYLINDER SHAFT	1	C

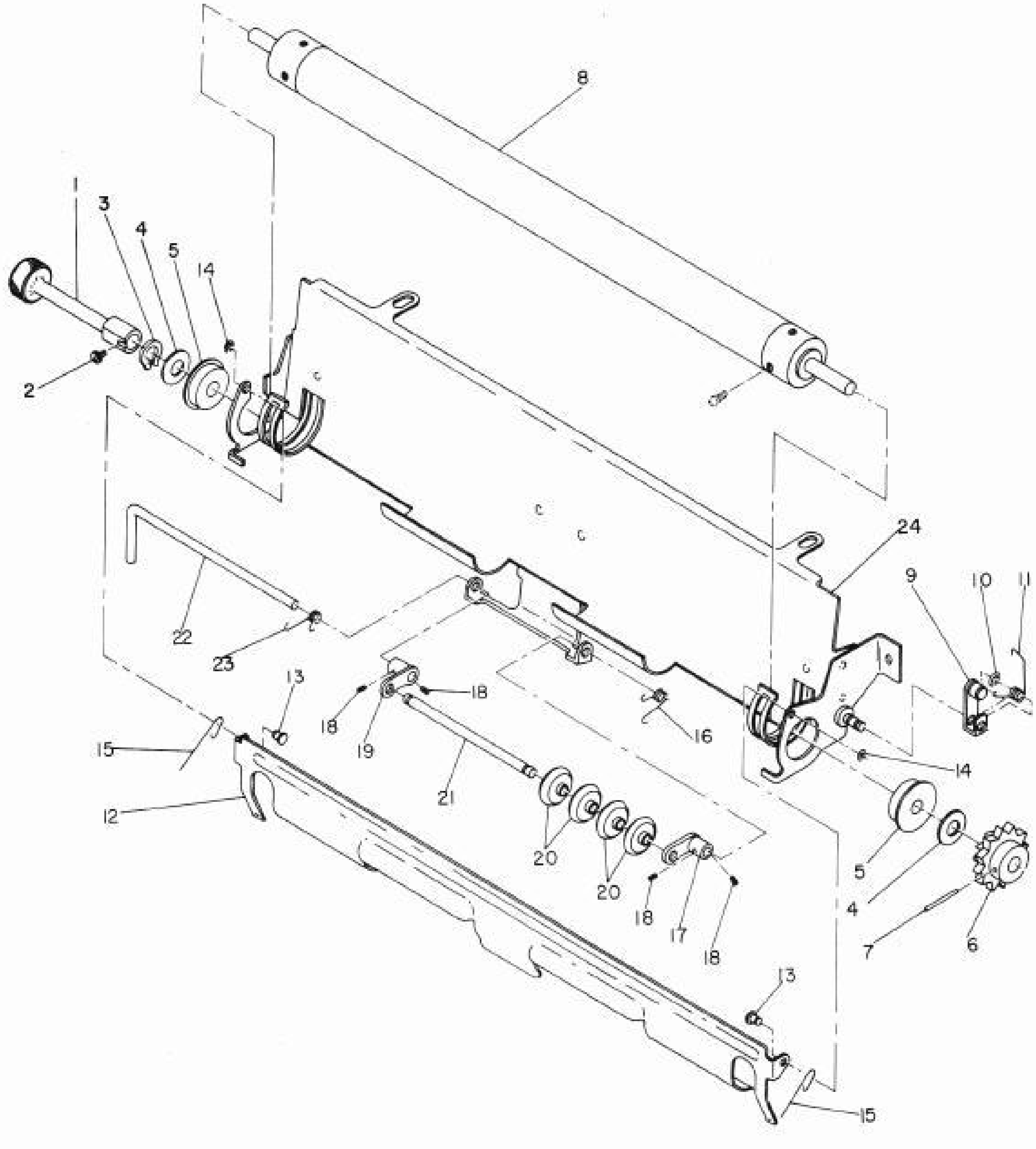


Figure 15. Paper Feed Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		PAPER FEED ASSEMBLY		
15 -000	30400-0001	...PAPER FEED ASSY	REF	C
15 -001	01255	....FEED KNOB	1	C
15 -002	05007-0018	....SCREW MACHINE	1	C
15 -003	05004-0025	....RING RETAINING	1	C
15 -004	05032-0016	....WASHER FLAT	1	C
15 -005	05012-0004	....BEARING	2	C
15 -006	01968	....RATCHET	1	C
15 -007	05080-0006	....PIN ROLL	1	C
15 -008	10125	....FEED ROLL ASSY	1	C
15 -009	37775	....BACKSTOP ASSY	1	C
15 -010	5133-12	....RING RETAINING 05004-0019 79136	1	C
15 -011	37797	....SPRING DETENT	1	C
15 -012	30389	....PRESS PAD	1	C
15 -013	30329	....PIN	2	C
15 -014	5133-16	....RING RETAINING 05004-0016 79136	2	C
15 -015	30363	....SPRING PAD	2	C
15 -016	38440	....SPRING RH	1	C
15 -017	38463	....LEVER ASSY RH	1	C
15 -018	05009-0001	....SETSCREW	4	C
15 -019	38464	....LEVER ASSY LH	1	C
15 -020	37729	....PRESS ROLL ASSY	4	C
15 -021	38442	....SHAFT ROLLER	1	C
15 -022	38443	....SHAFT RELEASE	1	C
15 -023	38441	....SPRING LEFT	2	C
15 -024	30388-0001	....GUIDE	1	C

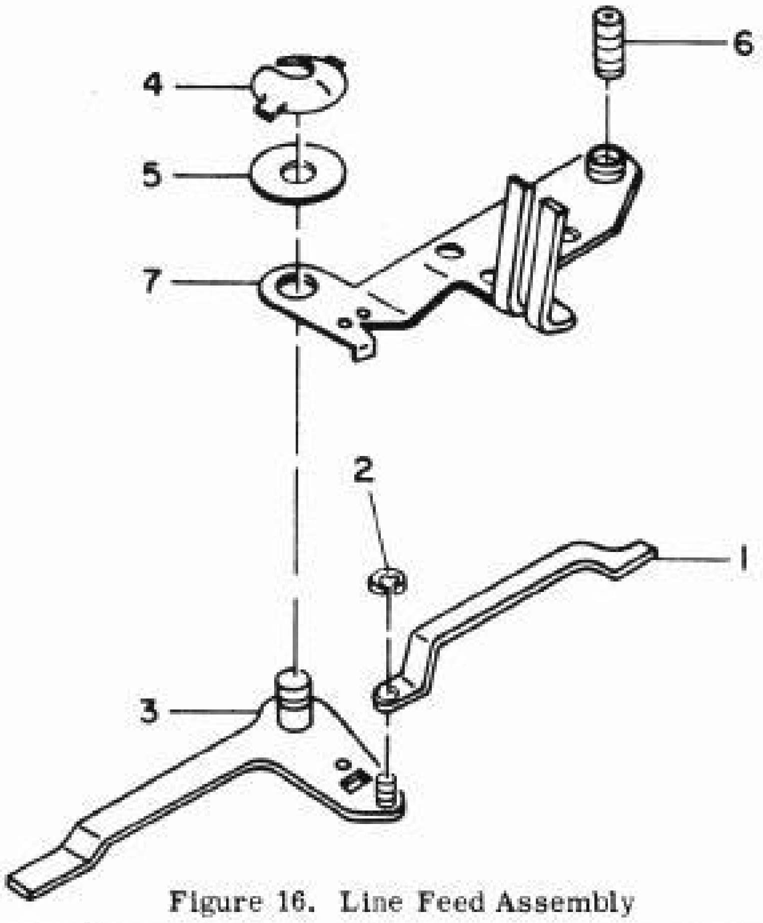


Figure 16. Line Feed Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		LINE FEED ASSEMBLY		
16 -000	38262	...LINE FEED ASSY	REF	C
16 -001	02244	....FEED SHIFT	1	C
16 -002	5133-9	....RING RETAINING 05004-0011 79136	1	C
16 -003	38261	....ARM ASSY	1	C
16 -004	5139-18	....RING RETAINING 05004-0036 79136	1	C
16 -005	05032-0012	....WASHER	1	C
16 -006	05009-0005	....SETSCREW	1	C
16 -007	04807	....PLATE ASSY	1	C
		FRONT SECTION ASSEMBLY		
17 -000	37735	...FRONT SEC ASSY	REF	C
17 -001	02622	....CABLE	1	C
17 -002	05572-0003-008	....SLEEVING	1	C
17 -003	02624	....CABLE	1	C
17 -004	37988	....BELT	2	C
17 -005	02623	....CABLE	1	C
17 -006	38243	....DRUMCBRKT ASSY	1	C
		- - - AP - - -		
17 -007	05007-0030	....SCREW MACHINE	2	C
17 -008	05007-0048	....SCREW MACHINE	2	C
		- - - • - - -		
17 -009	38311	....ARM ASSY	1	C
17 -010	05008-0053	.....SCREW MACHINE	1	C
17 -011	38310	.....ARM	1	C
17 -012	01663	....PRINT ASSY	1	C
17 -013	05008-0054	.....SCREW MACHINE	1	C
17 -014	04827	.....ARM	1	C
17 -015	38097	....ARM ASSY	1	C
17 -016	05008-0054	.....SCREW MACHINE	1	C
17 -017	37911	.....ARM	1	C
17 -018	03577-0003	....PRINT LEV ASSY	1	C
		- - - AP - - -		
17 -019	5133-31	....RING RETAONING 05004-0017 79136	1	C
17 -020	5133-31	....RING RETAINING 05004-0017 79136	1	C
		- - - • - - -		
17 -021	03657	.....WASHER FELT	2	C
17 -022	01250	.....LEVER ASSY	1	C
17 -023	38098	....LINKAGE ASSY	1	C

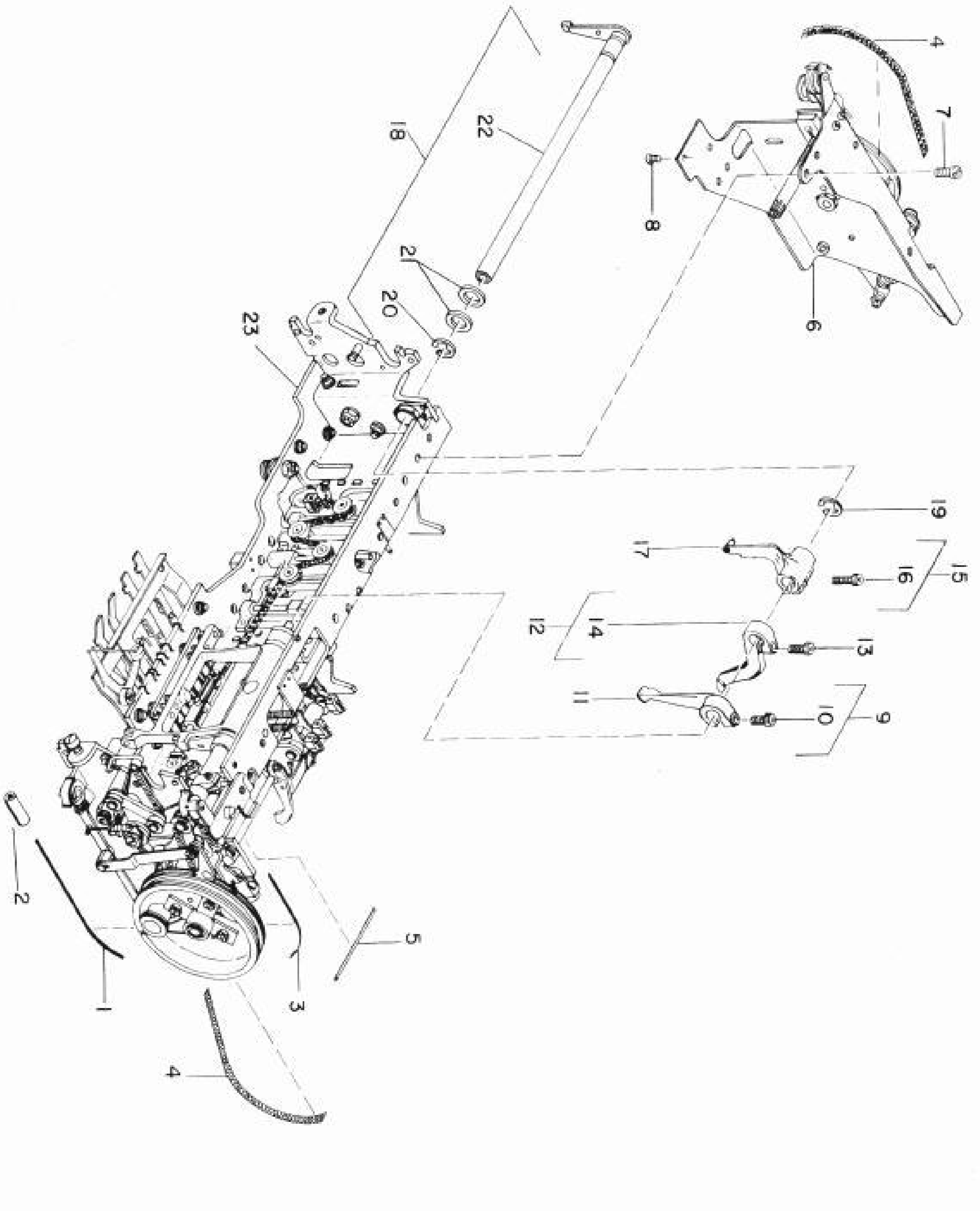


Figure 17. Front Section Assembly

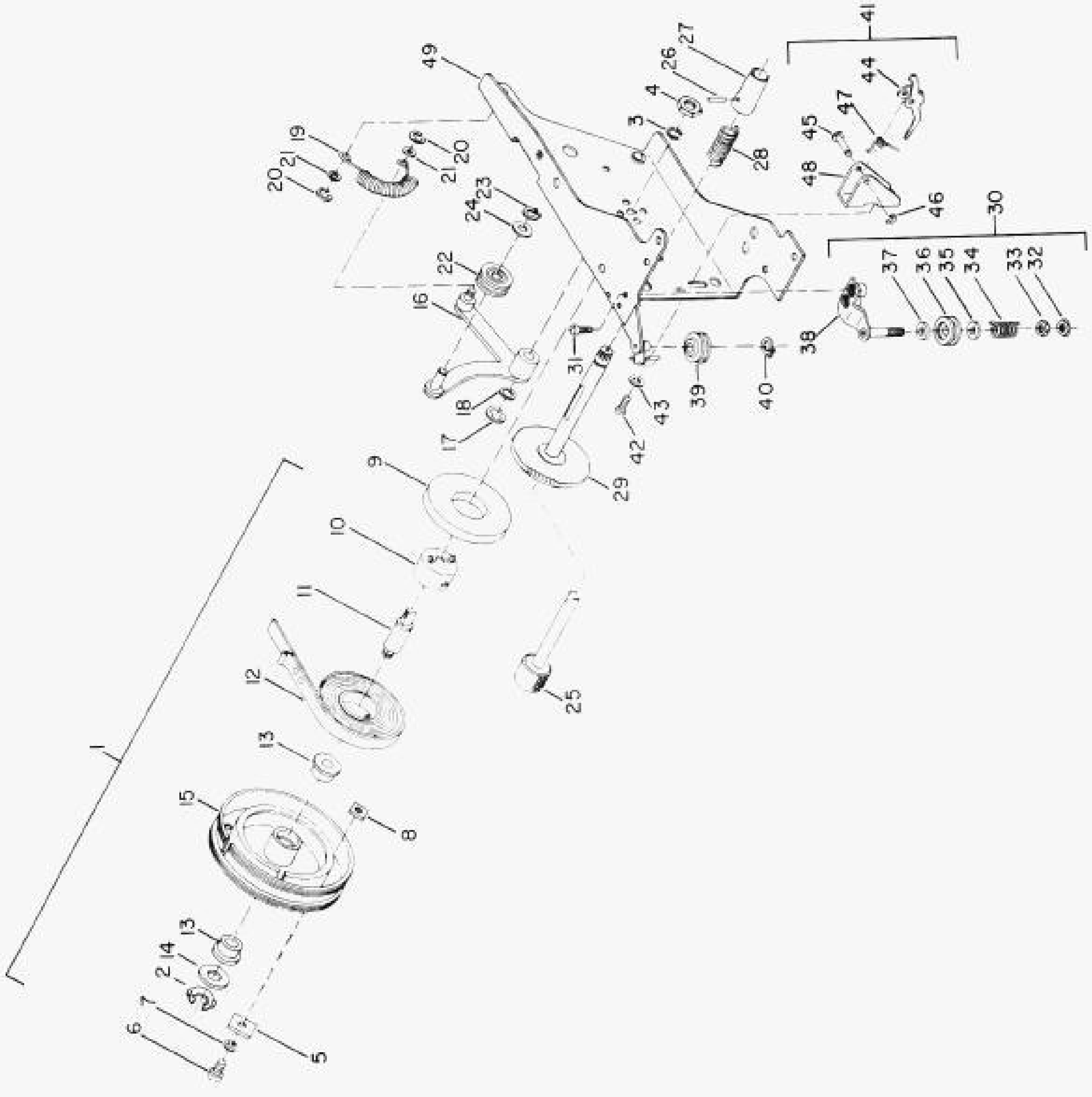


Figure 18. Drum and Take Up Bracket Assembly

DRUM AND TAKE UP BRACKET ASSEMBLY

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
18 -000	38243	....DRUMBRKT ASSY			REF	C
18 -001	38242	.....DRUM ASSY			1	C
		- - - AP - - -				
18 -002	5139-12	.....RING RETAINING	05004-0039	79136	1	C
18 -003	AN935-10L	.....WASHER LOCK	05006-0012	88044	1	C
18 -004	05030-0001	.....NUT HEX			1	C
		- - - * - - -				
18 -005	30017	......CLAMP			1	C
18 -006	05007-0017	......SCREW MACHINE			1	C
18 -007	AN935-4L	......WASHER LOCK	05006-0004	88044	1	C
18 -008	30018	......CLAMP NUT			1	C
18 -009	03173	......GUARD			1	C
18 -010	01745	......CUP			1	C
18 -011	38248	......SHAFT			1	C
18 -012	01332	......SPRING			1	C
18 -013	05226-0001	......BEARING			1	C
18 -014	02106	......WASHER			1	C
18 -015	38249	......DRUM			1	C
18 -016	01407-0002	.....ARM ASSY			1	C
		- - - AP - - -				
18 -017	05004-0022	.....RING RETAINING			1	C
18 -018	05032-0016	.....WASHER FLAT			1	C
		- - - * - - -				
18 -019	01756	.....TAKE-UP SPRING			1	C
		- - - AP - - -				
18 -020	5133-12	.....RING RETAINING			2	C
18 -021	05032-0029	.....WASHER FLAT			2	C
		- - - * - - -				
18 -022	37509	.....PULLEY			1	C
		- - - AP- - -				
18 -023	05004-0033	.....RING RETAINING			1	C
18 -024	03159	.....SPACER			1	C
		- - - * - - -				
18 -025	29141	.....KNOB			1	C
18 -026	05070-0001	.....PIN GROOVED			1	C
18 -027	04294	.....LOCK SLIDE			1	C
18 -028	29144	.....SPRING			1	C
18 -029	29138	.....DIAL ASSY			1	C
18 -030	36334	.....BRKT ASSY			1	C
		- - - AP - - -				
18 -031	05007-0038	.....SCREW MACHINE			2	C
		- - - * - - -				
18 -032	05030-0027	......NUT HEX			1	C
18 -033	05030-0008	......NUT HEX			1	C
18 -034	36345	......SPRING COMP			1	C
18 -035	36344	......WASHER			1	C
18 -036	36337	......PULLEY ASSY			1	C
18 -037	36336	......WASHER			1	C
18 -038	36335	......BRKT ASSY			1	C
18 -039	38005	.....PULLEY ASSY			1	C
		- - - AP - - -				
18 -040	05004-0022	.....RING RETAINING			1	C
		- - - * - - -				
18 -041	30472	.....LEVER ASSY			1	C
		- - - AP - - -				
18 -042	05007-0033	.....SCREW MACHINE			2	C
18 -043	05032-0005	.....WASHER FLAT			2	C
		- - - * - - -				
18 -044	04295	......LEVER			1	C
18 -045	04297	......PIN			1	C
18 -046	5133-9	......RING RETAINING	05004-0011	79136	1	C
18 -047	04298	......SPRING			1	C
18 -048	04532	......BRKT LEVER			1	C
18 -049	38024	.....BRACKET			1	C

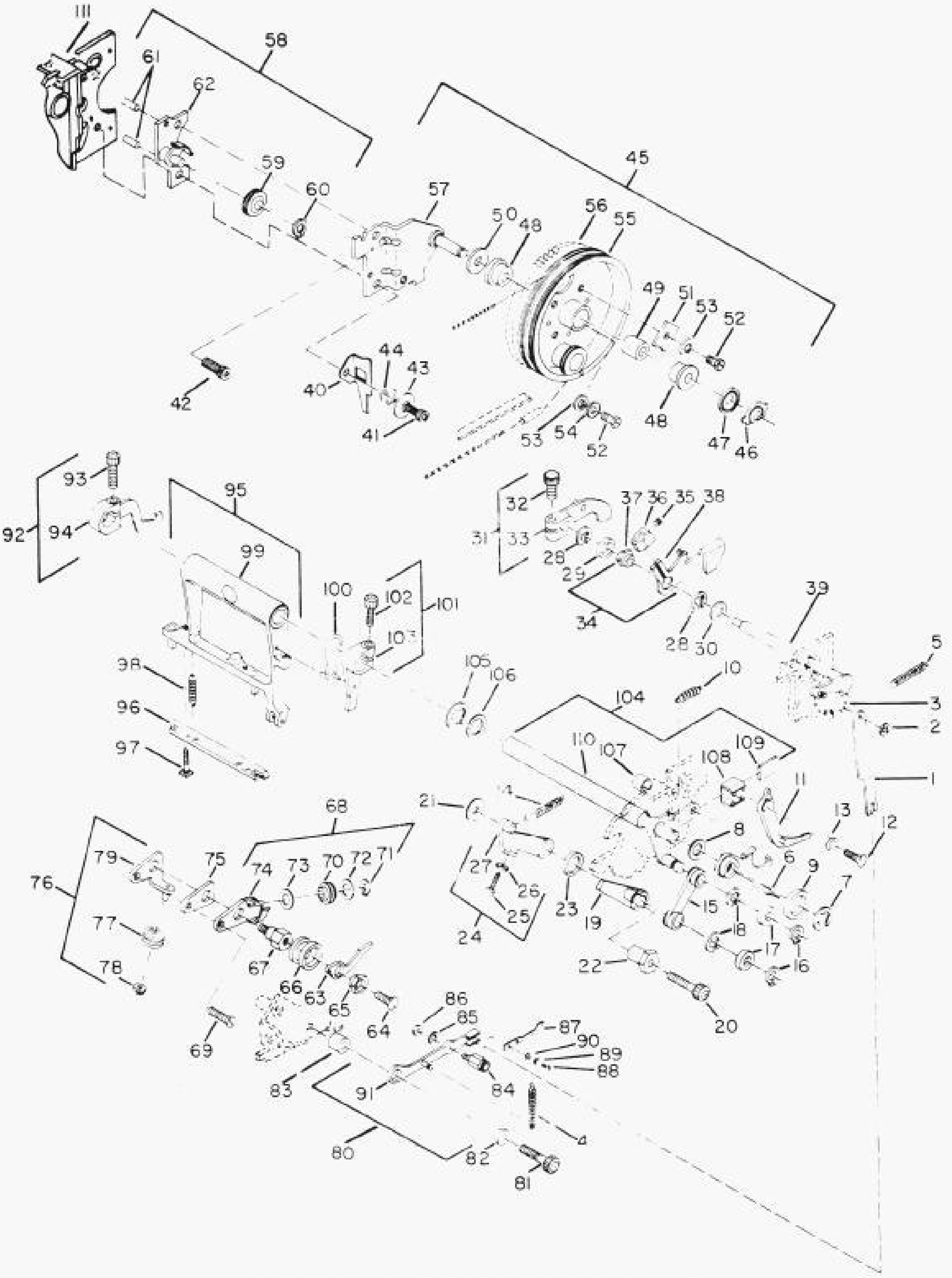


Figure 19. Advance Drum and Linkage Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		ADVANCE DRUM AND LINKAGE ASSEMBLY		
19 -000	38098	....LINKAGE ASSY	REF	C
19 -001	01368	.....PAWL LINK	1	C
		- - - AP - - -		
19 -002	5133-9	.....RING RETAINING 05004-0011 79136	1	C
		- - - * - - -		
19 -003	02408	.....SPACER	1	C
19 -004	37836	.....SPRING	1	C
19 -005	01750	.....SPRING	1	C
19 -006	01393	.....LEVER		C
		- - - AP - - -		
19 -007	05004-0030	.....RING RETAINING	1	C
		- - - * - - -		
19 -008	02381	.....SHIM	1	C
19 -009	03667	.....WASHER FELT	1	C
19 -010	01730	.....SPRING	1	C
19 -011	37726	.....PAWL	1	C
		- - - AP - - -		
19 -012	05198-0001	.....SCREW MACHINE	1	C
19 -013	37456	.....ECCENTRIC	1	C
		- - - * - - -		
19 -014	01731	.....SPRING	1	C
19 -015	02379	.....LINK ASSY	1	C
		- - - AP - - -		
19 -016	05004-0025	.....RING RETAINING	2	C
19 -017	03658	.....FELT WASHER	2	C
19 -018	05004-0022	.....RING RETAINING	2	C
		- - - * - - -		
19 -019	04819	.....ARM ASSY	1	C
19 -020	05008-0031	.....SCREW MACHINE	1	C
19 -021	02106	.....WASHER	1	C
19 -022	02105	.....ECCENTRIC	1	C
19 -023	02667	.....FELT WASHER	1	C
19 -024	01399	.....PAWL ASSY	1	C
19 -025	05008-0046	......SCREW MACHINE	1	C
19 -026	05030-0007	......NUT HEX	1	C
19 -027	04870	......DETENT LEVER	1	C
19 -028	05004-0022	.....RING RETAINING	1	C
19 -029	036[illegible]0	.....WASHER FELT	1	C
19 -030	03660	.....WASHER FELT	1	C
19 -031	01166	.....CAMFOLLOW ASSY	1	C
19 -032	05008-0048	......SCREW MACHINE	2	C
19 -033	04816	......CAM FOLLOWER	1	C
19 -034	03212	.....LEVER	1	C
19 -035	05009-0001	......SETSCREW	1	C
19 -036	01673	......CLAMP	1	C
19 -037	03208	......ECCENTRIC	1	C
19 -038	03209	......LEVER	1	C
19 -039	04815	.....SHAFT	1	C
19 -040	38406	.....PAWL GUIDE	1	C
19 -041	05008-0033	.....SCREW MACHINE	1	C
19 -042	05008-0003	.....SCREW MACHINE	1	E
19 -043	00815	.....WASHER FLAT	1	E
19 -044	36373	.....GUIDE ADV PAWL	1	C
19 -045	38241	.....DRUM ASSY	1	C
19 -046	5139-12	......RING RETAINING 05004-0039 79136	1	C
19 -047	38844	......SPACER	1	C
19 -048	05012-0070	......BEARING	2	C
19 -049	38846	......BUSHING SLEEVE	1	C
19 -050	00815	......SPACER	1	C
19 -051	01425	......CLAMP	3	C
		- - - AP - - -		
19 -052	03219	......SCREW	4	C
19 -053	05006-0009	......WASHER LOCK	4	C
		- - - * - - -		
19 -054	01600	......SPACER	1	C
19 -055	38246	......DRUM ASSY	1	C
19 -056	37567	......RATCHET ASSY	1	C

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
19 -057	38244	......BRKT			1	C
19 -058	38103	.....BRKTASSYPULLEY			1	C
19 -059	38005	......PULLEY			1	C
		- - - AP - - -				
19 -060	05004-0041	......RING RETAINING			1	C
		- - - * - - -				
19 -061	05003-0001	......PIN DOWELL			2	C
19 -062	04813	......SHAFT ASSY			1	C
19 -063	01163	.....LATCH			1	C
		- - - AP - - -				
19 -064	05007-0057	.....SCREW MACHINE			1	C
19 -065	02559	.....ECCENTRIC			1	C
		- - - * - - -				
19 -066	03653	.....WASHER FELT			2	C
19 -067	02312	.....STUD			1	C
19 -068	02309	.....BRKT ASSY			1	C
		- - - AP - - -				
19 -069	05007-0029	.....SCREW MACHINE			1	C
		- - - * - - -				
19 -070	03141	......PULLEY ASSEMBLY			1	C
19 -071	05004-0041	......RING RETAINING			1	C
19 -072	03159	......SPACER			1	C
19 -073	03161	......SPACER			1	C
19 -074	04823	......SHAFT ASSY			1	C
19 -075	02307	.....SPACER			1	C
19 -076	38102	.....BRKT ASSY			1	C
19 -077	38005	......PULLEY ASSY			1	C
		- - - AP - - -				
19 -078	05004-0041	......RING RETAINING			1	C
		- - - * - - -				
19 -079	04822	......SHAFT			1	C
19 -080	37728	.....PAWL ASSY			1	C
		- - - AP - - -				
19 -081	05008-0015	.....SCREW MACHINE			1	C
19 -082	37457	.....ECCENTRIC			1	C
		- - - * - - -				
19 -083	37458	.....SPACER			1	C
19 -084	37455	......ECCENTRIC			1	C
19 -085	1202-00	......WASHER LOCK	05006-0007	78189	1	C
19 -086	05030-0002	......NUT HEX			1	C
19 -087	37453	......LEVER CHECKPAWL			1	C
19 -088	05007-0068	......SCREW MACHINE			2	C
19 -089	AN935-2L	......WASHER LOCK	05006-0002	88044	2	C
19 -090	05032-0014	......WASHER			2	C
19 -091	37727	......ARM			1	C
19 -092	01664	.....CAMFOLLOW ASSY			1	C
19 -093	05008-0054	......SCREW MACHINE			1	C
19 -094	04818	......ARM ASSY			1	C
19 -095	02073-0003	.....LEVER ASSY			1	C
19 -096	02015	......BAR			1	C
		- - - AP - - -				
19 -097	02744	......SCREW			2	C
		- - - * - - -				
19 -098	38101	......SPRING			2	C
19 -099	01154	......LEVER			1	C
19 -100	02842	.....SPRING			1	C
19 -101	02728	.....ARM ASSY			1	C
19 -102	05008-0053	......SCREW MACHINE			1	C
19 -103	02726	......ARM			1	C
19 -104	01284-0004	.....LEVER ASSY			1	C
		- - - AP - - -				
19 -105	05004-0017	.....RING RETAINING			1	C
19 -106	03181	.....SPACER			1	C
19 -107	02385	.....STRIP			1	C
		- - - * - - -				
19 -108	03652	......CLIP			1	C
19 -109	03651	......STRIP			1	C
19 -110	38301	......SHAFT ASSY			1	C
19 -111	38099	.....FRAME ASSY			1	C

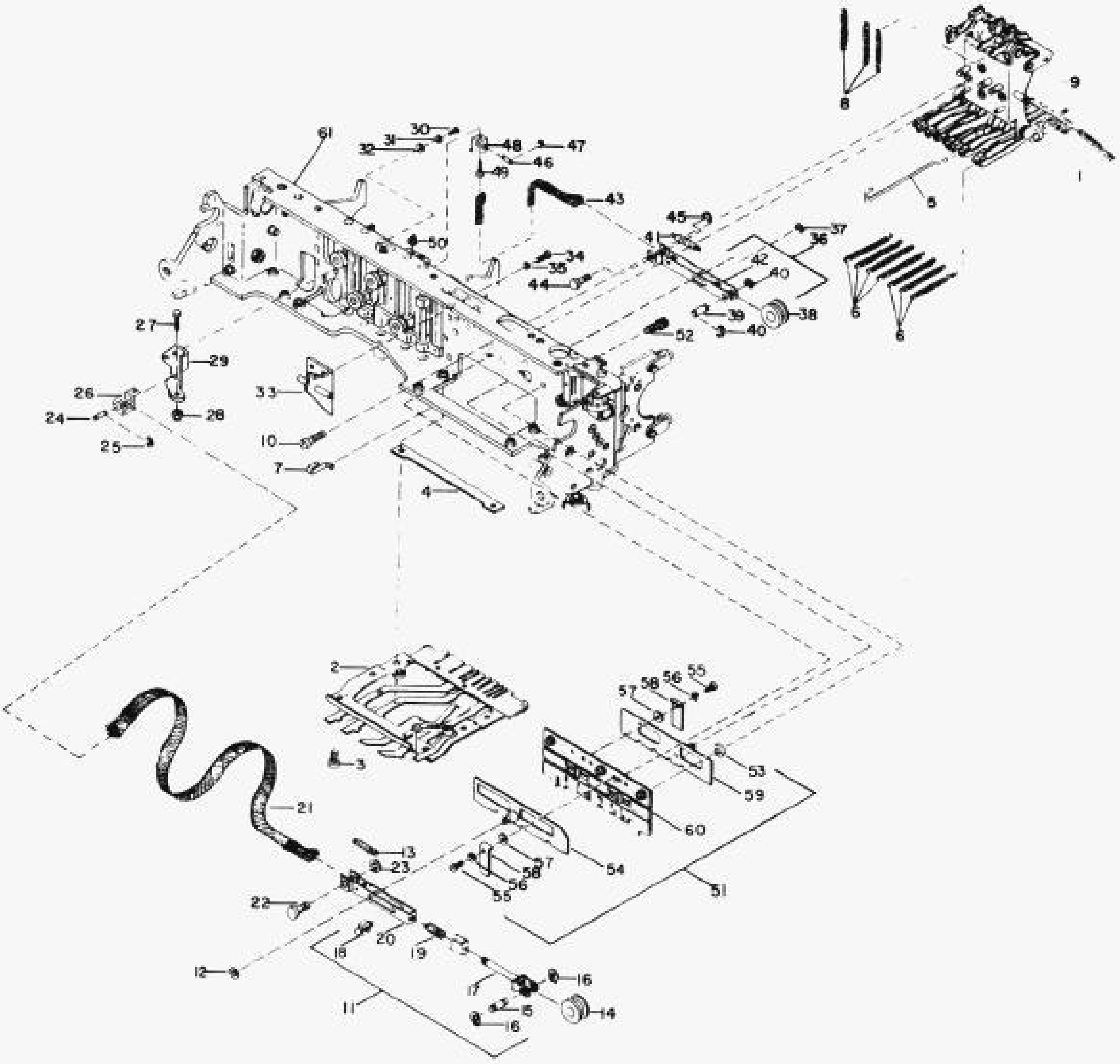


Figure 20. Function Selector Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		FUNCTION SELECTOR ASSEMBLY		
20 -000	38099	.....FUNCT SEL ASSY	REF	C
20 -001	01744	......SPRING	1	C
20 -002	38065	......FUNCTION ASSY	1	C
		- - - AP - - -		
20 -003	05007-0033	......SCREW MACHINE	3	C
		- - - • - - -		
20 -004	01917	......STOP STRIP	1	C
20 -005	03007	......CONN ROD	1	C
20 -006	01688	......SPRING	7	C
20 -007	33621	......CLIP SPRING	7	C
20 -008	01701	......SPRING	3	C
20 -009	33384	......CLUTCH REL ASSY	1	C
20 -010	05007-0038	......SCREW MACHINE	4	C
20 -011	38104	......CONN ASSY LAT	1	C
		- - - AP - - -		
20 -012	5133-12	......RING RETAINING 05004-0019 79136	1	C
20 -013	01607	......SPRING	1	C
		- - - • - - -		
20 -014	03141	.......PULLEY	1	C
20 -015	01741	.......PIN	1	C
20 -016	05004-0033	.......RING RETAINING	2	C
20 -017	37945	.......ROD	1	C
20 -018	01921	.......SLIDE	1	C
20 -019	01922	.......SPRING	1	C
20 -020	37524	.......STRIP ASSY	1	C
20 -021	38853	......BELT LAT	1	C
		- - - AP - - -		
20 -022	38306	......PIN	1	C
20 -023	5133-12	......RING RETAINING	1	C
		- - - • - - -		
20 -024	37506	......CHAIN PIN	1	C
20 -025	5133-12	......RET RING 05004-0019 79136	2	C
20 -026	37802	......YOKE-BELT-LAT	1	C
20 -027	37799	.....SCREW ADJ	1	C
20 -028	05030-0013	.....NUT HEX LKG	1	C
20 -029	37803	......BRACKET	1	C
		- - - AP - - -		
20 -030	05007-0130	......SCREW MACHINE	2	C
20 -031	05006-0005	......WASHER LOCK	2	C
20 -032	05032-0005	......WASHER FLAT	2	C
		- - - • - - -		
20 -033	01676	......BRKT ASSY	1	C
		- - - AP - - -		
20 -034	05007-0016	......SCREW MACHINE	4	C
20 -035	1204-03	......WASHER LOCK 05006-0021 79189	4	C
		- - - • - - -		
20 -036	38105	......STRIP ASSY	1	C
		- - - AP - - -		
20 -037	5133-12	......RET RING 05004-0019 79136	1	C
		- - - • - - -		
20 -038	38004	......PULLEY	1	C
20 -039	03146	......PIN	1	C
20 -040	05004-0018	......RING RETAINING	2	C
20 -041	01607	......SPRING	1	C
20 -042	37525	......STRIP	1	C
20 -043	38854	......BELT ROTARY	1	C
20 -044	37506	......BELT PIN	1	C
20 -045	5133-12	......RING RETAINING 05004-0019 79136	2	C
20 -046	37506	......CHAIN PIN	1	C
20 -047	5133-12	......RING RETAINING 05004-0019 79136	2	C
20 -048	37801	......YOKE	1	C
20 -049	37799	......SCREW MACHINE	1	C
20 -050	05030-0013	......NUT HEX LKG	1	C
20 -051	01630-0003	......SLIDE ASSY	1	C
		- - - AP - - -		
20 -052	05008-0010	......SCREW MACHINE	3	C
20 -053	01600	......SPACER	3	C
		- - - • - - -		
20 -054	37516	.......SLIDE	1	C
20 -055	05007-0002	.......SCREW MACHINE	4	C
20 -056	AN935-3L	.......WASHER LOCK 05006-0003 88044	4	C
20 -057	01601	.......SPACER	4	C
20 -058	01606	.......CLIP	4	C
20 -059	01124	.......SLIDE ASSY	1	C
20 -060	37495	.......SLIDE ASSY	1	C
20 -061	38100	......FRAME ASSY	1	C

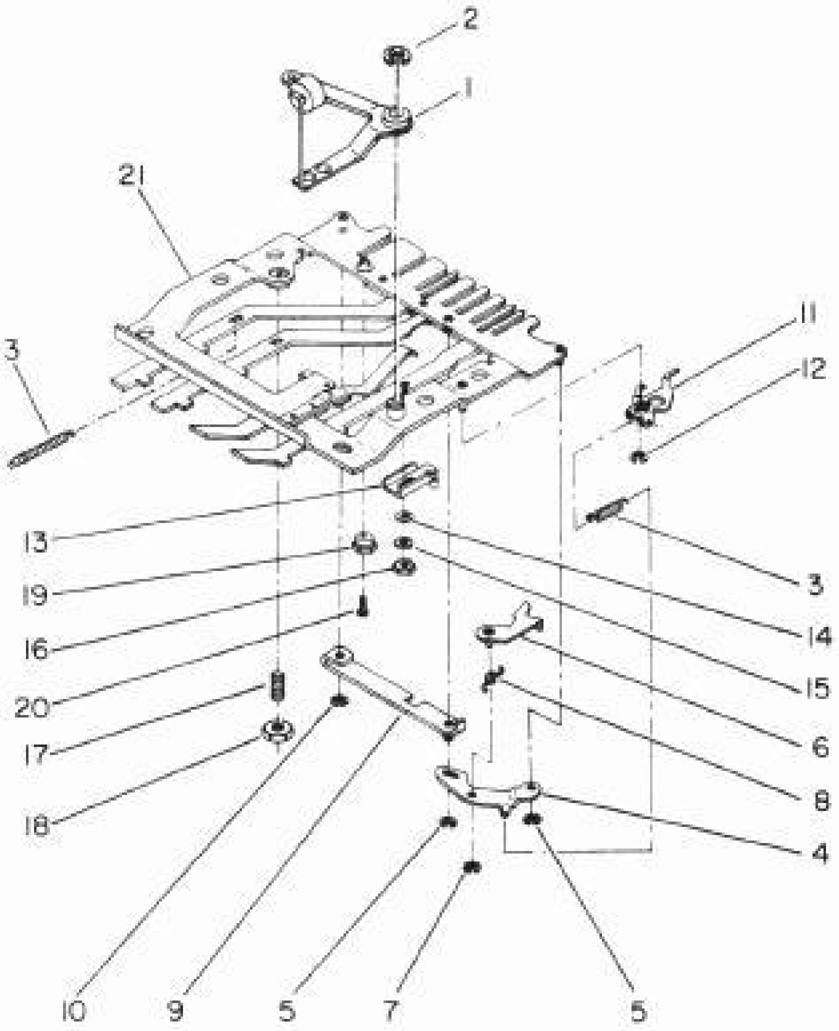


Figure 21. Manual Function Slide Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		MANUAL FUNCTION SLIDE ASSY		
21 -000	38065	......SLIDE ASSY	REF	C
21 -001	03004	.......LEVER ASSY	1	C
		- - - AP - - -		
21 -002	05004-0029	.......RING RETAINING	1	C
		- - - * - - -		
21 -003	01718	.......SPRING	5	C
21 -004	38035	.......RET LEVER	1	C
21 -005	05004-0029	.......RING RETAINING	1	C
21 -006	33372	.......LATCH ASSY	1	C
21 -007	05004-0045	.......RING RETAINIIG	1	C
21 -008	30675	.......LATCH SPRING	1	C
21 -009	38037	.......FEED ASSY	1	C
21 -010	05004-0045	.......RING RETAINING	2	C
21 -011	30677	.......LEVER ASSY	1	C
21 -012	05004-0045	.......RING RETAINING	1	C
21 -013	30673	.......ADJ SLIDE	1	C
21 -014	05032-0015	.......WASHER FLAT	1	C
21 -015	AN935-2L	.......WASHER LOCK 05006-0002 88044	1	C
21 -016	05030-0002	.......NUT HEX	1	C
21 -017	05098-0002	.......SETSCREW	1	C
21 -018	05030-0003	.......NUT HEX	1	C
21 -019	30577	.......ECCENTRIC	1	C
21 -020	05008-0004	.......SCREW	1	C
21 -021	38039	.......BRACKET	1	C

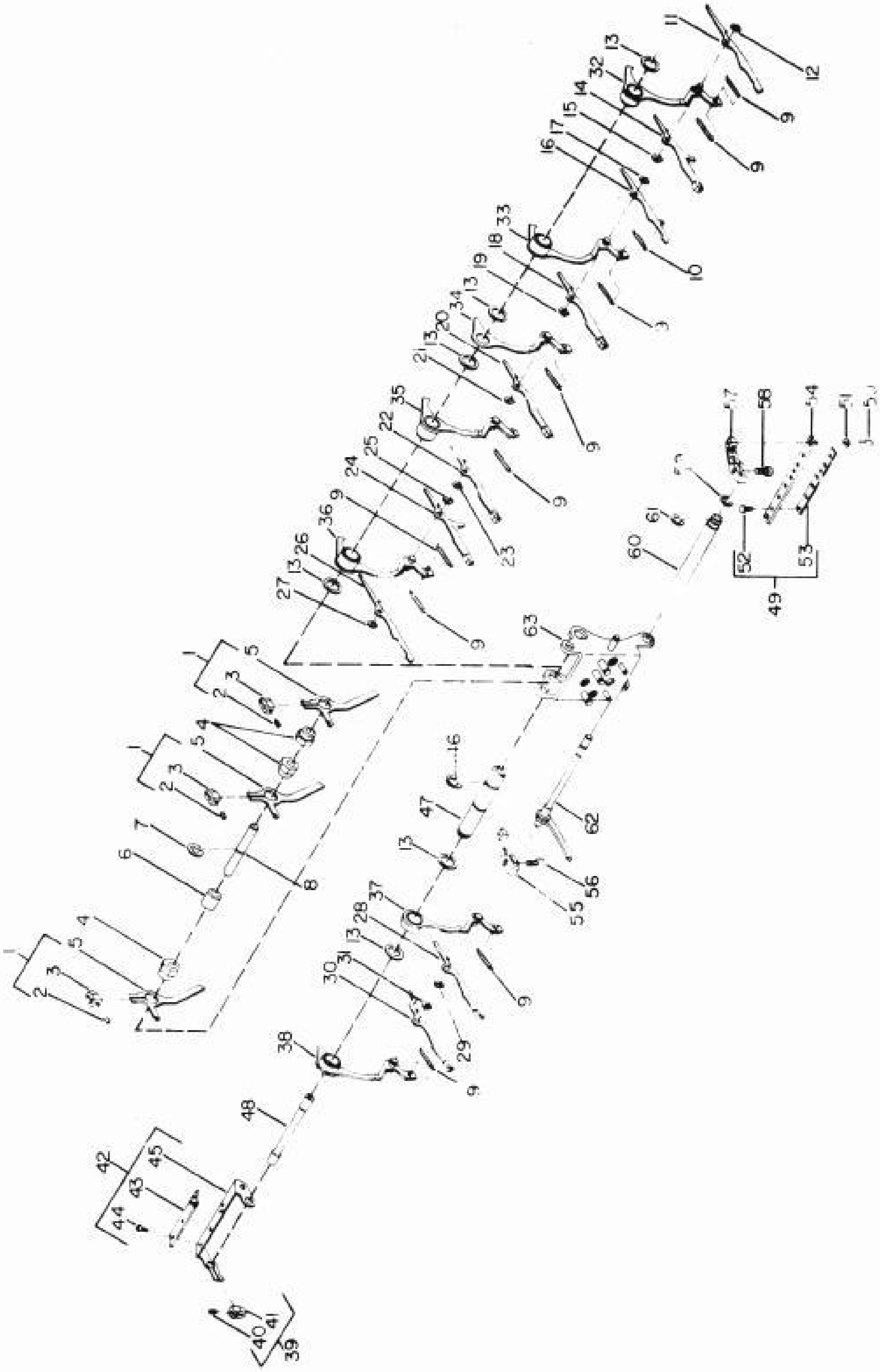


Figure 6-22. Function Clutch Release and Backstop Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		FUNCTION CLUTCH REL & BACKSTOP ASSY		
22 -000	33384	......CLUTCH REL ASSY	REF	C
22 -001	00221	.......CLAMP	3	C
22 -002	05009-0001	........SETSCREW	1	C
22 -003	01673	........CLAMP	1	C
22 -004	01699	.......ECCENTRIC	3	C
22 -005	01698	.......BACKSTOP	3	C
22 -006	03258	.......SPACER	1	C
22 -007	05004-0022	.......RING RETAINING	1	C
22 -008	01700	.......SHAFT	1	C
22 -009	01689	.......SPRING	9	C
22 -010	01656	.......SPRING	1	C
22 -011	01684	.......LEVER	1	C
22 -012	05004-0012	.......RING RETAINING	1	C
22 -013	01666	.......SPACER	6	C
22 -014	02018	.......LEVER ASSY	1	C
22 -015	05004-0012	.......RING RETAINING	1	C
22 -016	01692	.......LEVER	1	C
22 -017	05004-0012	.......RING RETAINING	1	C
22 -018	02020	.......LEVER ASSY	1	C
22 -019	05004-0012	.......RING RETAINING	1	C
22 -020	02021	.......LEVER ASSY	1	C
22 -021	05004-0012	.......RING RETAINING	1	C
22 -022	02020	.......LEVER ASSY	1	C
22 -023	05004-0012	.......RING RETAINING	1	C
22 -024	02019	.......LEVER ASSY	1	C
22 -025	05004-0012	.......RING RETAINING	1	C
22 -026	01684	.......LEVER	1	C
22 -027	05004-0012	.......RING RETAINING	1	C
22 -028	02020	.......LEVER ASSY	1	C
22 -029	05004-0012	.......RING RETAINING	1	C
22 -030	33225	.......LEVER ASSY	1	C
22 -031	05004-0012	.......RING RETAINING	1	C
22 -032	33381	.......ARM ASSY	1	C
22 -033	01687	.......ARM ASSY	1	C
22 -034	01681	.......ARM ASSY	1	C
22 -035	01680	.......ARM ASSY	1	C
22 -036	33379	.......ARM ASSY	1	C
22 -037	01678	.......ARM ASSY	1	C
22 -038	01677	.......ARM ASSY	1	C
22 -039	00221	.......CLAMP ASSY	1	C
22 -040	05009-0001	........SETSCREW	1	C
22 -041	01673	........CLAMP	1	C
22 -042	02508	.......BAR ASSY	1	C
22 -043	02507	........PLATE	1	C
22 -044	05008-0009	........SCREW	5	C
22 -045	01674	........BAR	1	C
22 -046	05004-0014	.......RING RETAINING	3	C
22 -047	01311	.......SHAFT	1	C
22 -048	01668	.......SHAFT	1	C
22 -049	02090	.......ROD ASSY	1	C
		- - - AP - - -		
22 -050	05072-0002	.......SCREW	2	C
22 -051	05032-0010	.......WASHER FLAT	2	C
		- - - * - - -		
22 -052	02030	........SCREW ADJ	7	C
22 -053	02136	........LOCK STRIP	1	C
22 -054	01686	........ROD	1	C
22 -055	30661	.......ARM-ACTUATOR	1	C
22 -056	05008-0008	.......SCREW	1	C
22 -057	30660	.......ARM ACTUATOR	1	C
22 -058	05008-0008	.......SCREW MACHINE	1	C
22 -059	05004-0018	.......RING RETAINING	1	C
22 -060	01612	.......SHAFT	1	C
22 -061	05004-0015	.......RING RETAINING	2	C
22 -062	01624	.......LEVER ASSY	1	C
22 -063	01685	.......FRAME ASSY	1	C

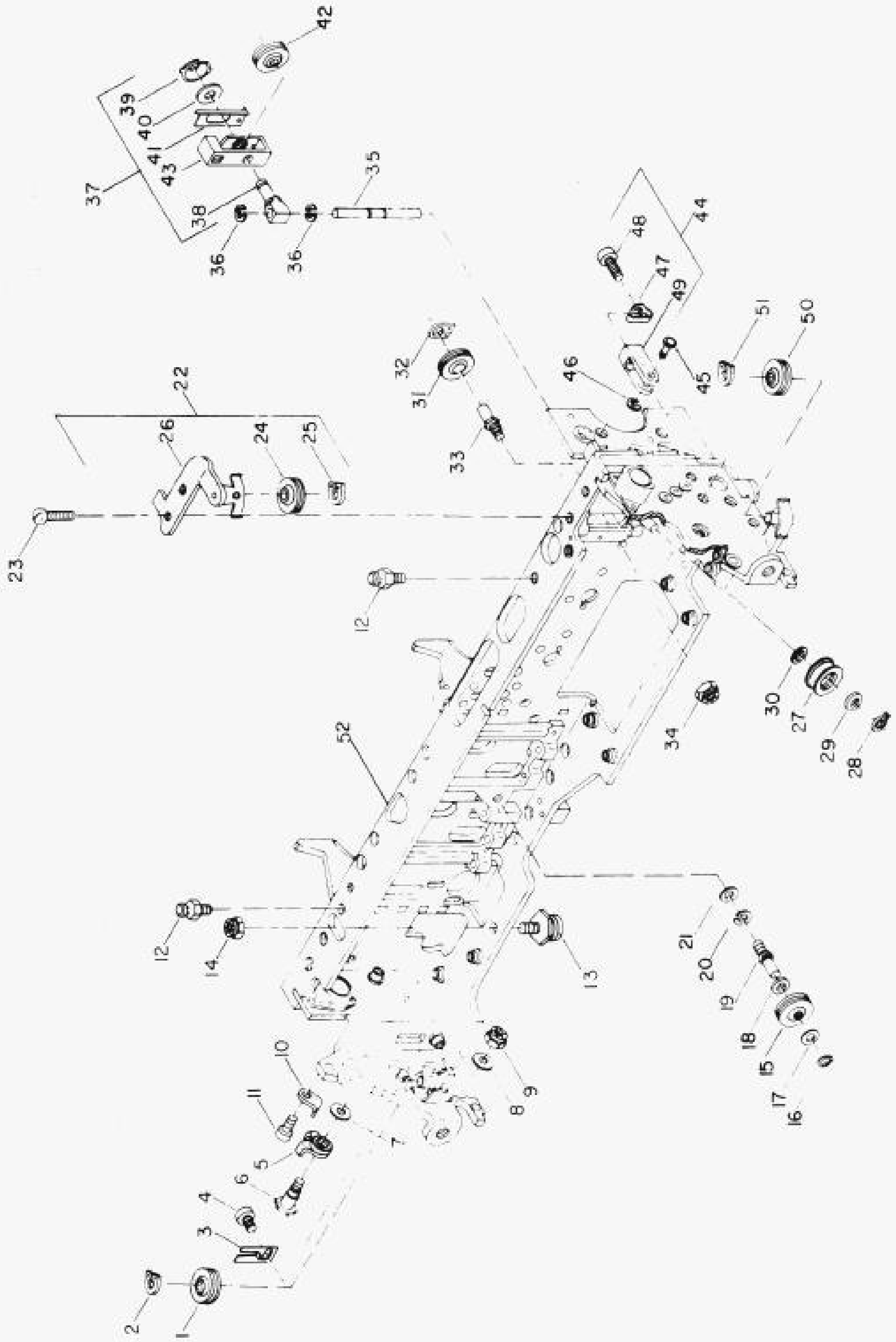


Figure 23. Front Frame Assembly-Front View

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		FRONT FRAME ASSEMBLY FRONT VIEW		
23 -000	38100	.......FRAME ASSY	REF	C
23 -001	38005	........PULLEY	1	C
		- - - AP - - -		
23 -002	05004-0041	........RING RETAINING	1	C
		- - - * - - -		
23 -003	01748	........BACKUP & GUIDE	1	C
		- - - AP - - -		
23 -004	05007-0033	........SCREW MACHINE	1	C
		- - - * - - -		
23 -005	01246	........STOP HAMMER	1	C
23 -006	01223	........PIVOT HAMMER	1	C
		- - - AP - - -		
23 -007	01866	........WASHER FLAT	1	C
23 -008	05032-0003	........WASHER FLAT	1	C
23 -009	05016-0003	........LOCKNUT	1	C
		- - - * - - -		
23 -010	01887	........STOP HAMMER	1	C
		- - - AP - - -		
23 -011	05008-0008	........SCREW	3	C
		- - - * - - -		
23 -012	03024	........PIN	2	C
23 -013	01916	........LOCATOR	2	C
		- - - AP - - -		
23 -014	50 FK 632	........LOCKNUT 05016-0009 56878	2	C
		- - - * - - -		
23 -015	37509	........PULLEY	1	C
		- - - AP - - -		
23 -016	05004-0033	........RING RETAINING	1	C
		- - - * - - -		
23 -017	03159	........SPACER	2	C
23 -018	03161	........SPACER	1	C
23 -019	37510	........POST	1	C
23 -020	05006-0004	........WASHER LOCK	1	C
23 -021	37578	........WASHER FLAT	1	C
23 -022	38106	........BRKT ASSY	1	C
		- - - AP - - -		
23 -023	05007-0017	........SCREW MACHINE	2	C
		- - - * - - -		
23 -024	38005	.........PULLEY	1	C
		- - - AP - - -		
23 -025	05004-0041	.........RING RETAINING	1	C
		- - - * - - -		
23 -026	38107	.........BRKT	1	C
23 -027	37509	........PULLEY	1	C
		- - - AP - - -		
23 -028	05004-0033	........RING RETAINING	1	C
		- - - * - - -		
23 -029	03159	........SPACER	1	
23 -030	03161	........SPACER	2	C
23 -031	38005	........PULLEY	1	C
		- - - AP - - -		
23 -032	05004-0041	........RING RETAINING	1	C
		- - - * - - -		
23 -033	01376	........PULLEY SHAFT	1	C
23 -034	05016-0002	........NUT	1	C
23 -035	03252	........PIN	1	C
23 -036	5103-12	........RING RETAINING 05004-0004 79136	2	C
23 -037	38108	........PULLEY	1	C
23 -038	03251	.........ROD	1	C
23 -039	5100-34	.........RING RETAINING 05004-0022 79136	1	C
23 -040	02841	.........SPACER	1	C
23 -041	03280	.........SPRING CLIP	1	C
23 -042	38004	.........PULLEY	1	C
23 -043	01126	.........CARRIAGE	1	C
23 -044	02509-0001	........CLAMP ASSY	2	C
		- - - AP - - -		
23 -045	02095	........PIVOT	2	C
23 -046	5133-9	........RING RETAINING 05004-0011 79136	4	C
		- - - * - - -		
23 -047	01363	.........CLAMP PAD	1	C
23 -048	05008-0028	.........SCREW MACHINE	1	C
23 -049	01362	.........CLAMP	1	C
23 -050	38005	........PULLEY	1	C
		- - - AP - - -		
23 -051	05004-0041	........RING RETAINING	1	C
		- - - * - - -		
23 -052	38111	........FRAME ASSY	1	C

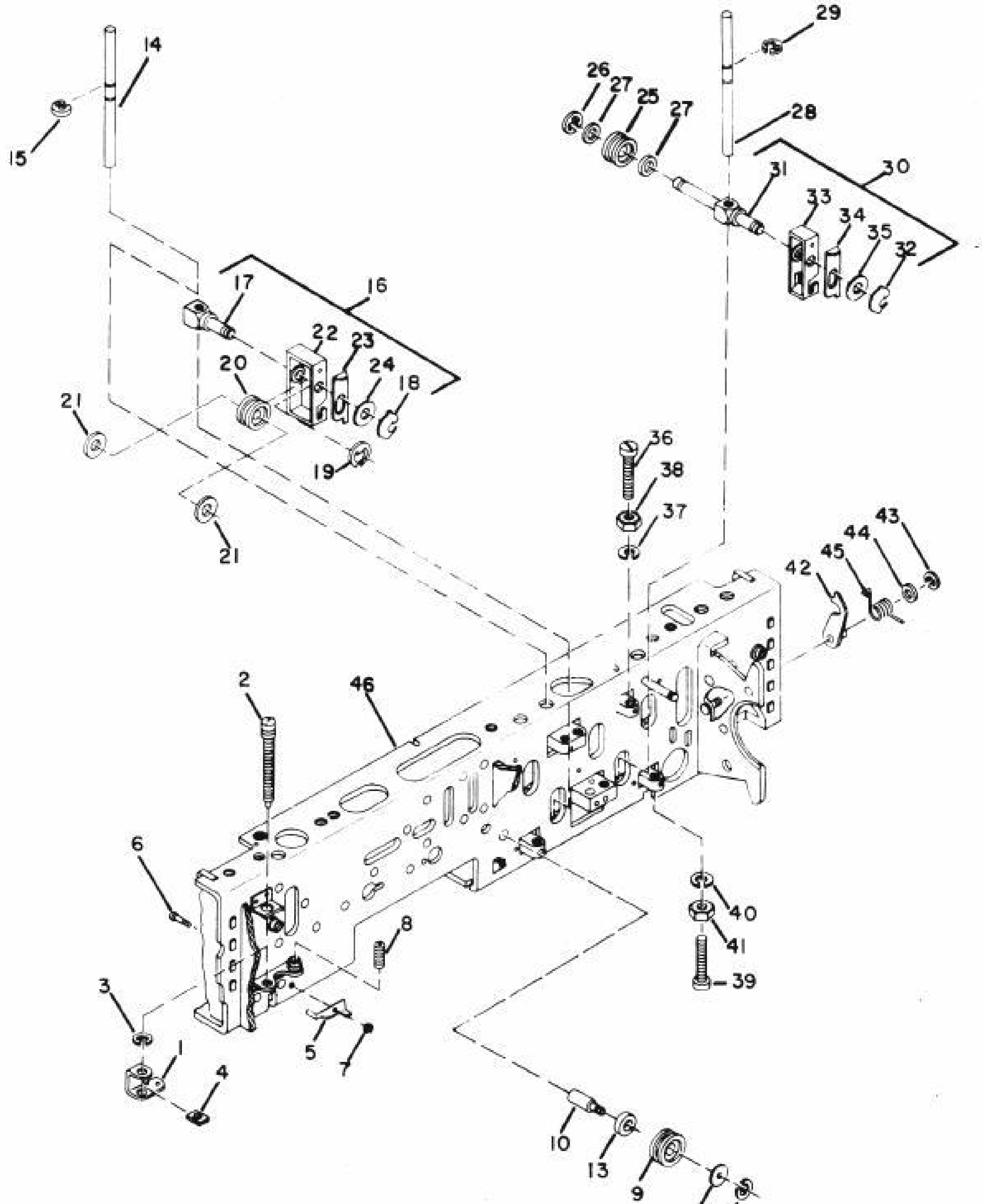


Figure 24. Front Frame Assembly-Rear View

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		FRONT FRAME ASSEMBLY REAR VIEW		
24 -000	38100	......FRAME ASSY	REF	C
24 -001	01856	.......BRACKET	1	C
		- - - AP - - -		
24 -002	01854	.......SCREW	1	C
24 -003	05004-0043	.......RING RETAINING	1	C
		- - - * - - -		
24 -004	02439	.......CABLE BLOCK	1	C
24 -005	03163	.......LEVER	1	C
		- - - AP - - -		
24 -006	03147	.......PIN	1	C
24 -007	05004-0023	.......RING RETAINING	1	C
		- - - * - - -		
24 -008	05009-0012	.......SETSCREW	1	C
24 -009	37509	.......PULLEY	1	C
		- - - AP - - -		
24 -010	37759	.......PIN	1	C
24 -011	05004-0011	.......RING RETAINING	1	C
		- - - * - - -		
24 -012	37757	.......SPACER	1	C
24 -013	37756	.......SPACER	1	C
24 -014	37800	.......PIN	2	C
24 -015	05004-0004	.......RING RETAINING	2	C
24 -016	38110	.......PULLEY ASSY	2	C
		- - - AP - - -		
24 -017	37512	........ROD	1	C
24 -018	05004-0042	........RING RETAINING	1	C
		- - - * - - -		
24 -019	05004-0018	........RING RETAINING	1	C
24 -020	37509	........PULLEY	1	C
24 -021	37507	........WASHER	2	C
24 -022	37482	........CARRIAGE	1	C
24 -023	03280	........CLIP SPRING	1	C
24 -024	02841	........SPACER	1	C
24 -025	37509	........PULLEY	3	C
		- - - AP - - -		
24 -026	05004-0033	........RING RETAINING	3	C
		- - - * - - -		
24 -027	03159	........SPACER	2	C
24 -028	37800	.......PIN	3	C
24 -029	05004-0004	.......RING RETAINING	2	C
24 -030	38109	.......PULLEY ASSY	3	C
		- - - AP - - -		
24 -031	37511	........ROD	3	C
24 -032	05004-0042	........RING RETAINING	1	C
		- - - * - - -		
24 -033	01126	........CARRIAGE	1	C
24 -034	03280	........CLIP SPRING	1	C
24 -035	02841	........SPACER	1	C
24 -036	04147	.......SCREW	4	C
24 -037	05006-0024	.......WASHER LOCK		C
24 -038	05030-0010	.......NUT HEX	4	C
24 -039	04145	.......SCREW	1	C
24 -040	05006-0024	.......WASHER LOCK	5	C
24 -041	05030-0010	.......NUT HEX	1	C
24 -042	30361	.......LEVER ASSY	1	C
		- - - AP - - -		
24 -043	5133-9	.......RING RETAINING 05004-0011 79136	2	C
		- - - * - - -		
24 -044	30305	.......SPACER	1	C
24 -045	30294	.......SPRING	1	C
24 -046	38111	.......FRAME ASSY	1	C

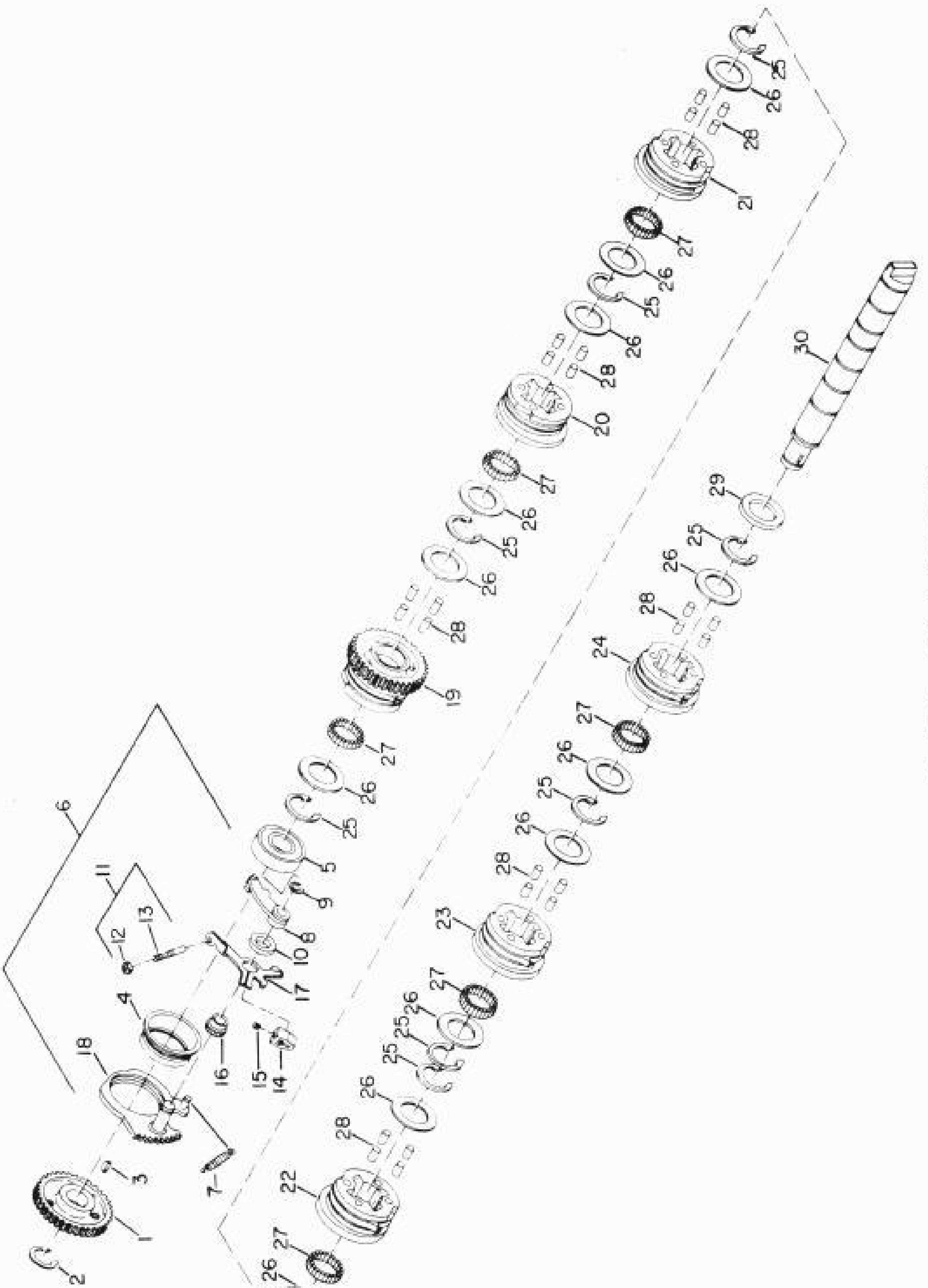


Figure 25. Selector Mainshaft Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
		SELECTOR MAINSHAFT ASSEMBLY				
25 -000	33131-0003	....SEL MAIN SHFT			REF	A
25 -000	33131-0002	....SEL MAIN SHFT			REF	F
25 -001	01323	.....GEAR			1	A
		- - - AP - - -				
25 -002	05004-0005	.....RING RETAINING			1	A
25 -003	02523	.....KEY WOODRUFF			1	A
		- - - * - - -				
25 -004	04529	.....BEARING RET LH			1	C
25 -005	05013-0001	.....BEARING			1	C
25 -006	29145	.....RETAINER ASSY			1	C
25 -007	01526	......SPRING			1	C
25 -008	01122	......LATCH			1	C
		- - - AP - - -				
25 -009	5103-18	......RING RETAINING	05004-0001	79136	1	C
		- - - * - - -				
25 -010	03655	......WASHER LOCK			1	C
25 -011	02028	......BACKSTOP ASSY			1	C
25 -012	05030-0007	.......NUT HEX			1	C
25 -013	05009-0031	.......SETSCREW			1	C
25 -014	01673	.......CLAMP			1	C
25 -015	05009-0001	.......SETSCREW			1	C
25 -016	02029	.......ECCENTRIC			1	C
25 -017	03068	.......LEVER			1	C
25 -018	04530	......RANGE			1	C
25 -019	01210	.....CLUTCH ASSY			1	C
25 -020	01211	.....CLUTCH ASSY			1	C
25 -021	01212	.....CLUTCH ASSY			1	C
25 -022	01213	.....CLUTCH ASSY			1	C
25 -023	01214	.....CLUTCH ASSY			1	C
25 -024	01215	.....CLUTCH ASSY			1	C
25 -025	5103-50	.....RING RETAINING	05004-0006	79136	8	C
25 -026	03866	.....WASHER			12	C
25 -027	01426	.....NEEDLE ROLLER			168	C
25 -028	01205-0001	.....CLUTCH ROLLER			24	C
25 -029	01235	.....SPACER			1	C
25 -030	01221	.....MAINSHAFT			1	C

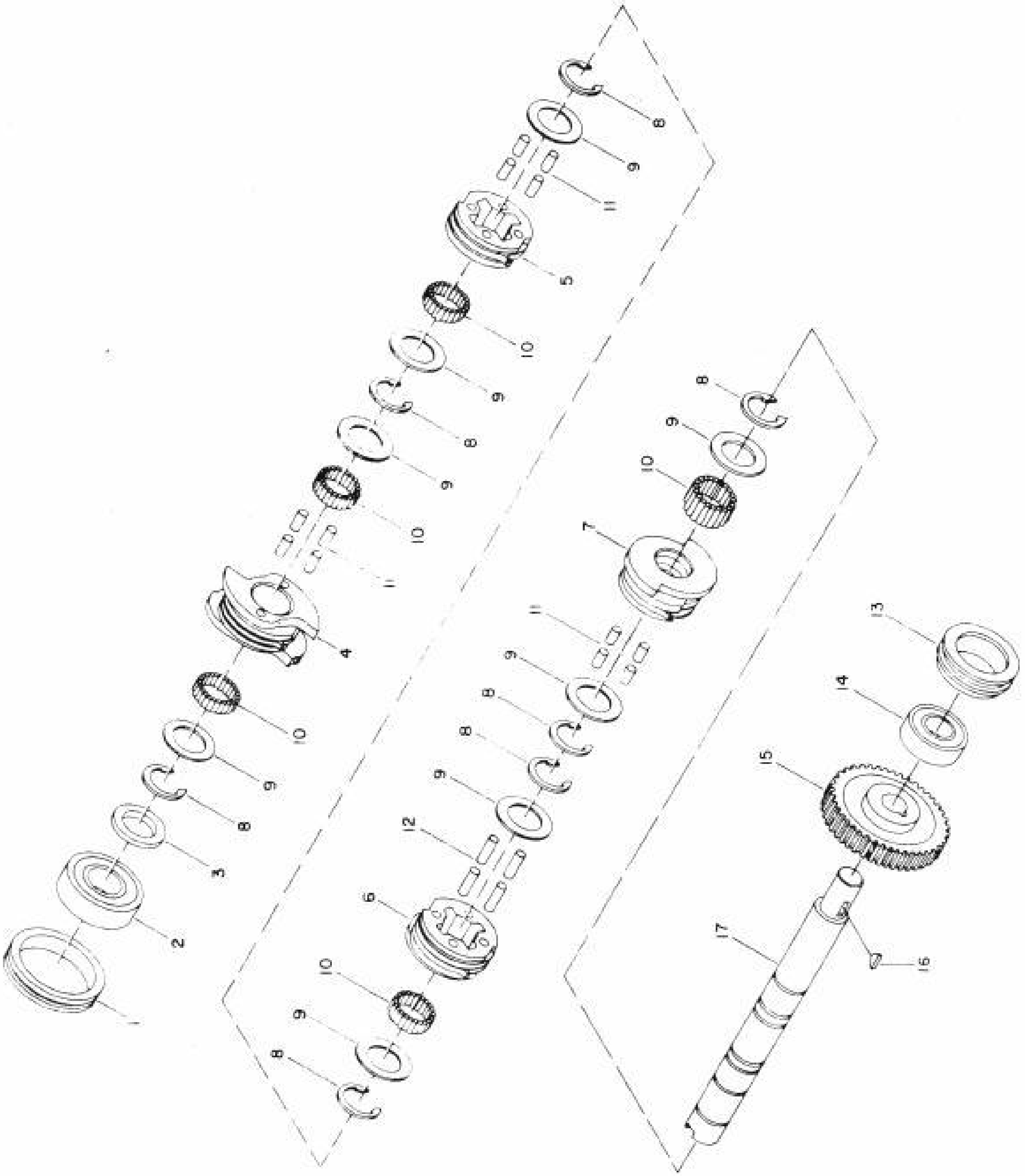


Figure 26. Function Mainshaft Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		FUNCTION MAINSHAFT ASSEMBLY		
26 -000	33032	....FUNCT SHFT ASSY	REF	C
26 -001	01347	.....BEARING RET	1	C
26 -002	05013-0002	.....BEARING	1	C
26 -003	01235	.....SPACER	1	C
26 -004	01216	.....CLUTCH ASSY	1	C
26 -005	01217	.....CLUTCH ASSY	1	C
26 -006	01218	.....CLUTCH ASSY	1	C
26 -007	01219	.....CLUTCH ASSY	1	C
26 -008	[illegible]	.....RING RETAINING	[illegible]	C
26 -009	03866	.....WASHER	[illegible]	C
26 -010	01426	.....NEEDLE ROLLER	140	C
26 -011	01205-0001	.....CLUTCH ROLLER	12	C
26 -012	01205-0002	.....CLUTCH ROLLER	4	C
26 -013	01237	.....BEARING RET RH	1	C
26 -014	05013-0001	.....BEARING	1	C
26 -015	01270	.....GEAR SPUR	[illegible]	C
26 -016	02523	.....KEY WOODRUFF	1	C
26 -017	01222	.....MAINSHAFT	1	C

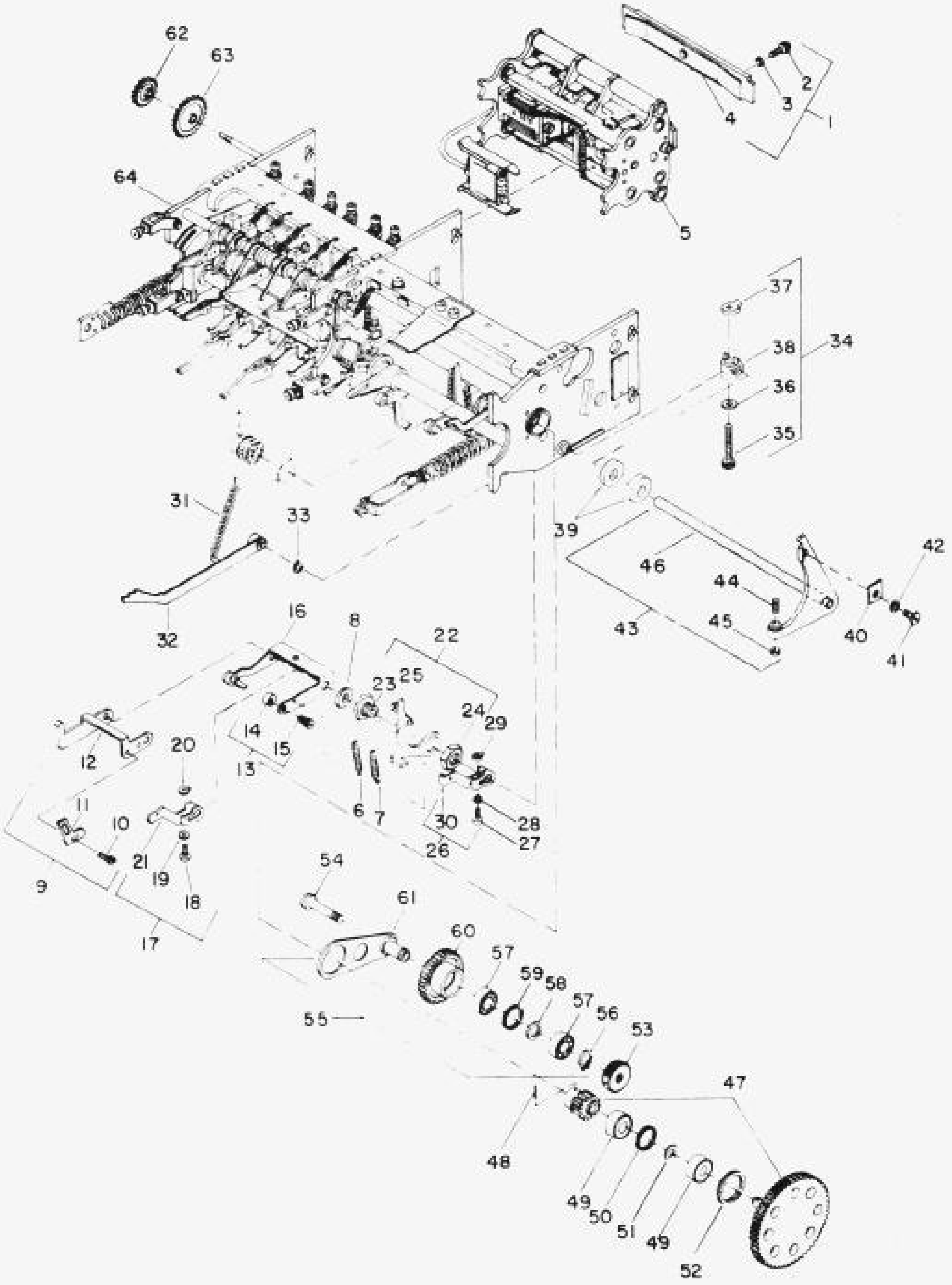


Figure 27. Rear Section Assembly

FIGURE AND INDEX NUMBER	PART NUMB	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
		REAR SECTION ASSEMBLY				
27 -000	37736-0003	...REAR SECT ASSY			REF	A
27 -000	37736-0001	...REAR SECT ASSY			REF	B
27 -000	37736-0002	...REAR SECT ASSY			REF	D
27 -001	01597	....LOCK ASSY			1	C
27 -002	05008-0008	.....SCREW MACHINE			2	C
27 -003	05006-0024	.....WASHER LOCK			2	C
27 -004	04804	.....BAR ASSY			1	C
27 -005	33024-0003	....SELECTOR ASSY			1	C
27 -006	01949	....SPRING			1	C
27 -007	01960	....SPRING			1	C
27 -008	00724	....SPACER			1	C
27 -009	04623	....ARM ASSY			1	D
27 -010	05008-0021	.....SCREW MACHINE			1	D
27 -011	04663	.....ARM ASSY			1	D
27 -012	04624	.....ACTUATOR ASSY			1	D
27 -013	01954-0002	....FEED ASSY			1	C
27 -014	37433	.....ECCENTRIC			1	C
27 -015	05008-0021	.....SCREW MACHINE			1	C
27 -016	04825	.....ACTUATOR ASSY			1	C
27 -017	30458	....ARM			1	C
27 -018	05008-0063	.....SCREW MACHINE			1	C
27 -019	36086	.....WASHER LOCK			1	C
27 -020	00824	.....NUT ANTI TURN			1	C
27 -021	30262	.....ARM ACTUATE			1	C
27 -022	02542	....CAM LOCK ASSY			1	C
27 -023	01950	.....BUSHING			1	C
27 -024	05030-0009	.....NUT HEX			1	C
27 -025	01955	.....CAM FOLLOWER LK			1	C
27 -026	30456	....ARM			1	C
27 -027	30686	....WASHER LOCK			1	C
27 -028	05008-0063	....SCREW MACHINE			1	C
27 -029	00824	.....NUT ANTI TURN			1	C
27 -030	30261	.....ARM ACTUATE			1	C
27 -031	02086	....SPRING			1	C
27 -032	02249	....PAWL			1	C
27 -033	5133-12	....RING RETAINING	05004-0019	79136	1	C
27 -034	39027	....CLAMP ASSY			3	C
27 -035	05008-0022	.....SCREW MACHINE			1	C
27 -036	05032-0014	.....SPACER			1	C
27 -037	00824	.....ANTI TURN NUT			1	C
27 -038	38864	.....CLAMP			1	C
27 -039	03658	....WASHER FELT			2	C
27 -040	30182	.....FINGER ADJ BLC			1	C
		- - - AP - - -				
27 -041	30183	.....ADJ BLCK SCRW			1	C
27 -042	AN935-2L	.....WASHER LOCK	05006-0002	88044	1	C
		- - - • - - -				
27 -043	39026	....LEVER AND SHAFT			1	C
27 -044	05009-0012	.....SETSCREW			1	C
27 -045	05030-0010	.....NUT HEX			1	C
27 -046	39025	.....SHAFT ASSY			1	C
27 -047	01280-0001	....PINION ASSEMBLY			1	C
27 -048	05070-0005	....PIN			1	C
27 -049	05013-0003	....BEARING			2	C
27 -050	RR-50	....RING RETAINING	05005-0001	80756	1	C
27 -051	01166	....SPACER			1	C
27 -052	RS-62	....RING RETAINING	05005-0002	80756	1	C
27 -053	03520	....GEAR LOCK ASSY			1	C
27 -054	01179	....STUD			1	C
27 -055	01278-0001	....GEAR ASSY			1	C
27 -056	5100-25	.....RING RETAINING	05004-0008	79136	1	C
27 -057	05012-0002	.....BEARING			2	C
27 -058	01281	.....SPACER			1	C
27 -059	RR-50	.....RING RETAINING	05005-0001	80756	1	C
27 -060	01174	.....IDLER GEAR			1	C
27 -061	01183	.....ARM			1	C
27 -062	02530	....60 WPM GEAR			1	C
27 -063	02531	....66 WPM GEAR			1	C
27 -064	38113-0003	....CLUTCH ASSY REL			1	A
27 -064	38113-0001	....CLUTCH ASSY REL			1	B
27 -064	38113-0002	....CLUTCH ASSY REL			1	D

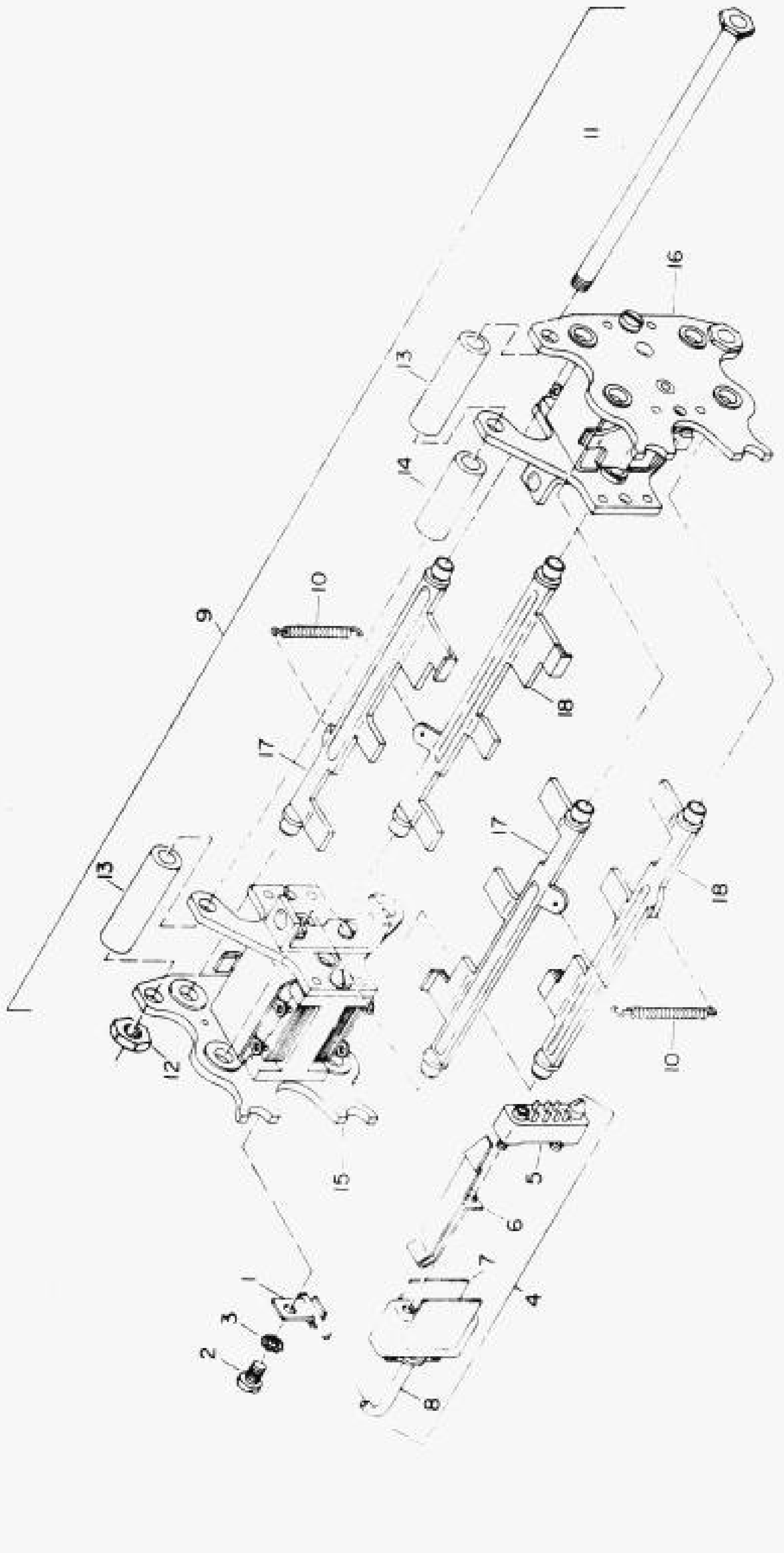


Figure 28. Selector Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SELECTOR ASSEMBLY		
28 -000	33024-0003	....SELECTOR	REF	C
28 -001	01592	.....CABLE CLAMP	1	C
		- - - AP - - -		
28 -002	05007-0003	.....SCREW MACHINE	1	C
28 -003	05006-0020	.....WASHER LOCK	1	C
		- - - * - - -		
28 -004	03947-0002	.....CONNECTOR ASSY	1	C
28 -005	05511-0131	......CONNECTOR	1	C
28 -006	02843	......LOCK CONNECTOR	2	C
28 -007	05539-0009	......HOOD	1	C
28 -008	37141	......HARNESS ASSY	1	C
28 -009	03919-0003	.....SELECTOR ASSY	1	C
28 -010	01589	......SPRING	2	C
28 -011	01578	......STUD ASSY	2	C
28 -012	05030-0006	......NUT HEX	2	C
28 -013	02546	......SPACER	4	C
28 -014	02547	......SPACER	2	C
28 -015	04547-0002	......FRAME ASSY	1	C
28 -016	04546	......FRAME ASSY	1	C
28 -017	30081	......LATCH ASSY	2	C
28 -018	30080	......LATCH ASSY	2	C

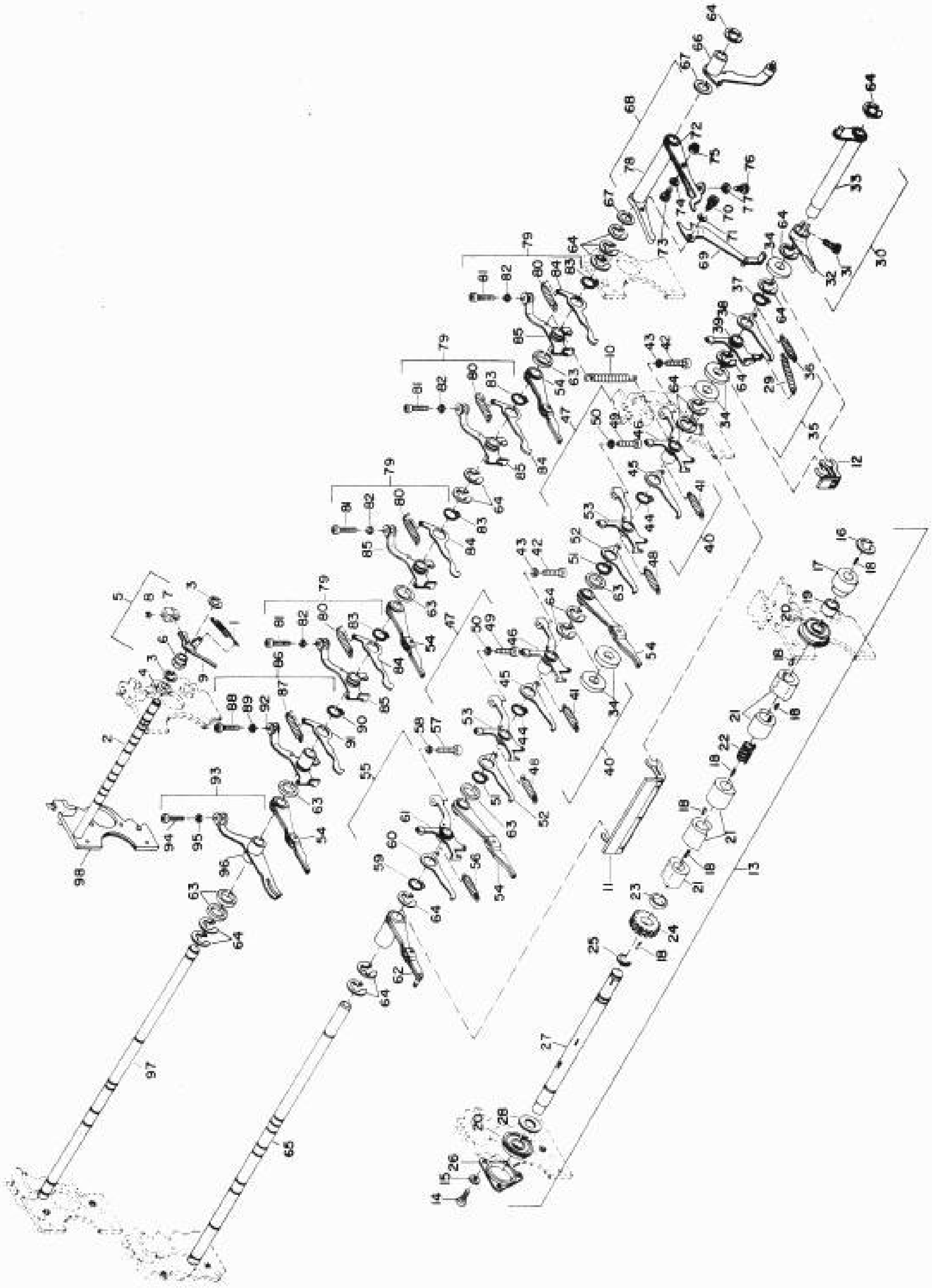


Figure 29. Clutch Release Backstop Assembly

CLUTCH REL BACKSTOP ASSEMBLY

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
29 -000	38113-0003	....CLUTCH ASSY REL			REF	A
29 -000	38113-0001	....CLUTCH ASSY REL			REF	B
29 -000	38113-0002	....CLUTCH ASSY REL			REF	D
29 -001	01850	.....SPRING			6	C
29 -002	01510	.....SHAFT			1	C
29 -003	05004-0022	.....RING RETAINING			14	C
29 -004	03658	.....WASHER FELT			10	C
29 -005	01114	.....BACKSTOP ASSY			6	C
29 -006	01104	......ECCENTRIC			1	C
29 -007	01673	......CLAMP			1	C
29 -008	05009-0001	......SETSCREW			1	C
29 -009	01103	......BACKSTOP LEVER			1	C
29 -010	01120	.....SPRING			6	C
29 -011	02189	.....WICK ASSY			1	C
29 -012	02194	.....WICK ASSY			1	C
29 -013	01265	.....SHAFT ASSY			1	C
29 -014	05007-0002	.....SCREW MACHINE			3	C
29 -015	AN935-3L	.....WASHER LOCK	05006-0003	88044	3	C
29 -016	05004-0031	......RING RETAINING			1	C
29 -017	01269	......FUNCTION CAM			1	C
29 -018	201	......KEY WOODRUFF	05015-0001	60120	7	C
29 -019	03134	......SPACER			1	C
29 -020	05012-0001	......BEARING			2	C
29 -021	01254	......CLUTCH CAM			5	C
29 -022	02922	......SPRING COMP			1	C
29 -023	02921	......SPACER			1	C
29 -024	01268	......GEAR			1	C
29 -025	05004-0014	......RING RETAINING			2	C
29 -026	01349	......BEARING RET			1	C
29 -027	01266	......SHAFT			1	C
29 -028	03012	.....SPACER			1	C
29 -029	01852	.....SPRING			1	C
29 -030	02612	.....ARM ASSY			1	C
29 -031	05008-0007	......SCREW MACHINE			1	C
29 -032	01153	......ARM			1	C
29 -033	34250	.....ARM ASSY			1	C
29 -034	03668	.....WASHER			5	C
29 -035	01123	.....RELFASE ASSY			1	C
29 -036	01116	......SPRING			1	C
29 -037	5100-34	......RING RETAINING	05004-0002	79136	1	C
29 -038	01106	......CLUTCH FINGER			1	C
29 -039	02374	......ARM			1	C
29 -040	02602	.....RELEASE ASSY			2	C
29 -041	01116	......SPRING			1	C
29 -042	03186	......SCREW			1	C
29 -043	05030-0007	......NUT HEX			1	C
29 -044	5100-34	......RING RETAINING	05004-0002	79136	2	C
29 -045	01106	......CLUTCH FINGER			1	C
29 -046	02605	......ARM ASSY			1	C
29 -047	02575	.....RELEASE ASSY			2	C
29 -048	01116	......SPRING			1	C
29 -049	03186	......SCREW			1	C
29 -050	05030-0007	......NUT HEX			1	C
29 -051	5100-34	......RING RETAINING	05004-0002	79136	1	C
29 -052	01106	......CLUTCH FINGER			1	C
29 -053	02572	......ARM ASSY			1	C
29 -054	37934	.....CAM ASSY			5	C
29 -055	02590	.....RELEASE ASSY			1	C
29 -056	01116	......SPRING			1	C
29 -057	03186	......SCREW			1	C
29 -058	05030-0007	......NUT HEX			1	C
29 -059	5100-34	......RING RETAINING	05004-0002	79136	1	C
29 -060	01106	......CLUTCH FINGER			1	C
29 -061	02589	......RELEASE ASSY			1	C
29 -062	38305	.....CAM ASSY			1	C
29 -063	03653	.....WASHER FELT			7	C
29 -064	05004-0027	.....RING RETAINING			19	C

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
29 -065	02610	.....SHAFT	1	C
29 -066	04801	.....LINK	1	C
29 -067	03657	.....WASHER FELT	2	C
29 -068	30394	.....CAM FOLLOWER	1	C
29 -069	04665	......LEVER ASSY	1	C
29 -070	05008-0021	......SCREW MACHINE	1	C
29 -071	05032-0005	......WASHER FLAT	1	C
29 -072	04580	......FOLLOWER	1	C
29 -073	05008-0013	......SCREW MACHINE	1	C
29 -074	05032-0006	......WASHER FLAT	1	C
29 -075	50 FA 440	......LOCKNUT 05016-0002 56878	1	C
29 -076	05008-0013	......SCREW MACHINE	1	C
29 -077	05030-0010	......NUT HEX	1	C
29 -078	04582	......CAM ASSY	1	C
29 -079	02599	.....RELEASE ASSY	4	C
29 -080	01116	......SPRING	1	C
29 -081	03186	......SCREW	1	C
29 -082	05030-0007	......NUT HEX	1	C
29 -083	5100-34	......RING RETAINING 05004-0002 79136	1	C
29 -084	01108	......CLUTCH FINGER	1	C
29 -085	02600	......ARM	1	C
29 -086	02591	.....RELEASE ASSY	1	C
29 -087	01116	......SPRING	1	C
29 -088	03186	......SCREW	1	C
29 -089	05030-0007	......NUT HEX	1	C
29 -090	5100-34	......RING RETAINING 05004-0002 79136	1	C
29 -091	01108	......CLUTCH FINGER	1	C
29 -092	02592	......ARM	1	C
29 -093	01117	.....LATCH ASSY	1	C
29 -094	03186	......SCREW	1	C
29 -095	05030-0007	......NUT HEX	1	C
29 -096	04803	......ARM	1	C
29 -097	02611	.....SHAFT	1	C
29 -098	38114-0001	.....FRAME ASSEMBLY	1	A
29 -098	38114-0002	.....FRAME ASSEMBLY	1	B
29 -098	38114-0003	.....FRAME ASSEMBLY	1	D

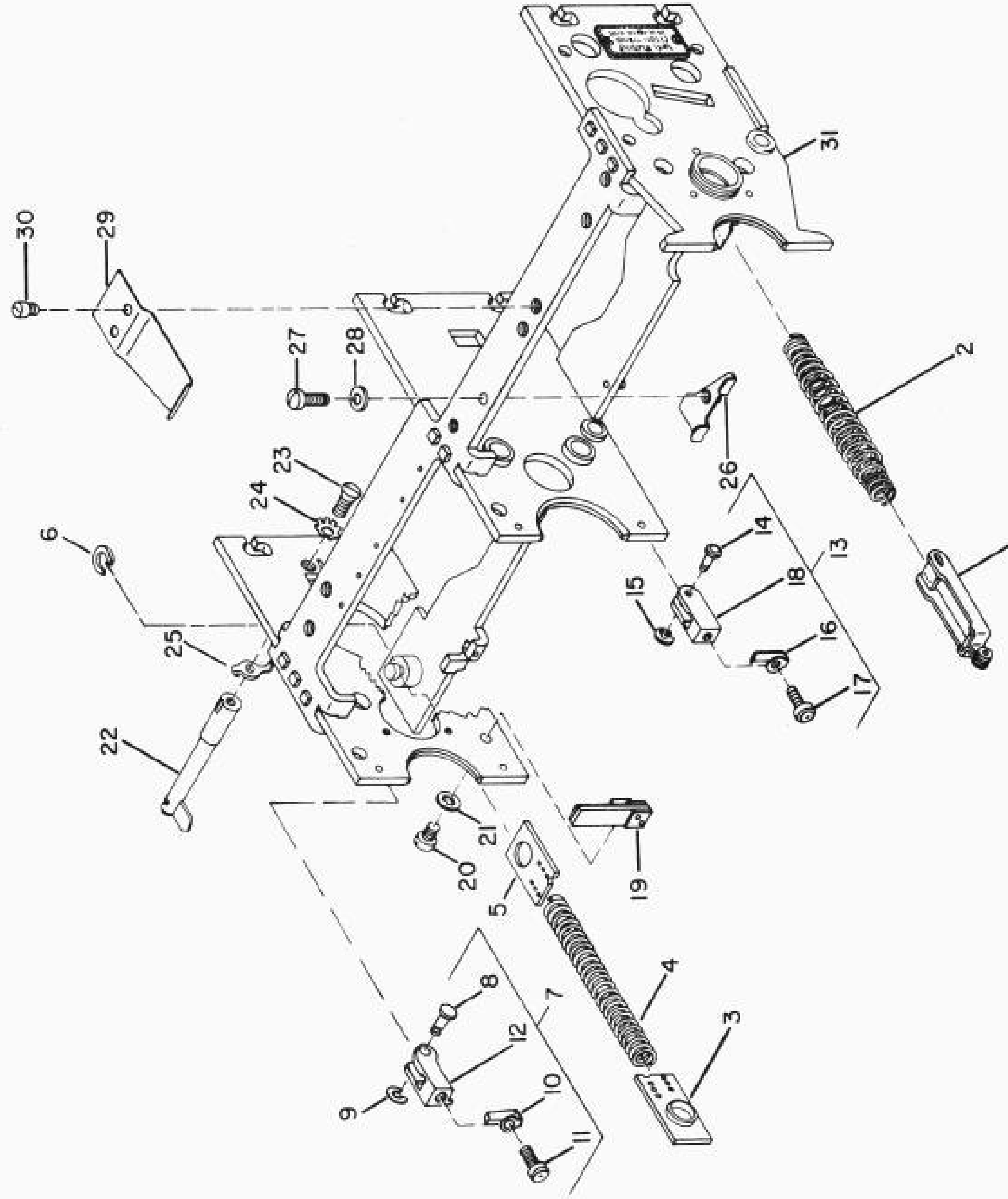


Figure 30. Rear Frame Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		REAR FRAME ASSEMBLY		
30 -000	38114-0001	.....FRAME ASSY	REF	A
30 -000	38114-0002	.....FRAME ASSY	REF	B
30 -000	38114-0003	.....FRAME ASSY	REF	D
30 -001	02093	......LINK ASSY SPRIN	1	C
30 -002	01614	......SPRING	1	C
30 -003	38400	......RETAINER SPRING	1	C
30 -004	01628	......SPRING	1	C
30 -005	38399	......ANCHOR		C
		- - - AP - - -		
30 -006	05004-0036	......RING RETAINING	1	C
		- - - * - - -		
30 -007	04531	......CLAMP ASSY	1	C
30 -008	02095	......PIVOT	1	C
30 -009	5133-9	......RING RETAINING 05004-0011 79136	1	C
30 -010	01363	.......CLAMP PAD	1	C
30 -011	05008-0028	.......SCREW	1	C
30 -012	04525	.......CLAMP	1	C
30 -013	02509-0001	......CLAMP ASSY	3	C
		- - - AP - - -		
30 -014	02095	......PIVOT	1	C
30 -015	5133-9	......RING RETAINING 05004-0011 79136	1	C
		- - - * - - -		
30 -016	01363	.......CLAMP PAD	1	C
30 -017	05008-0028	.......SCREW MACHINE	1	C
30 -018	01362	.......CLAMP	1	C
30 -019	04812	......BRKT ASSY	1	C
		- - - AP - - -		
30 -020	05007-0016	......SCREW MACHINE	1	C
30 -021	05006-0009	......WASHER LOCK	1	C
		- - - * - - -		
30 -022	02510-0001	......POST	1	C
		- - - AP - - -		
30 -023	05007-0048	......SCREW MACHINE	1	C
30 -024	05006-0016	......WASHER LOCK	1	C
		- - - * - - -		
30 -025	04515	......POSTION CLIP	1	C
30 -026	04810	......CLIP	1	C
		- - - AP - - -		
30 -027	05007-0062	......SCREW MACHINE	1	C
30 -028	05032-0013	......WASHER FLAT	1	C
		- - - * - - -		
30 -029	02137	......STOP	1	C
		- - - AP - - -		
30 -030	05007-0024	......SCREW MACHINE	2	C
		- - - * - - -		
30 -031	38204-0001	......FRAME	1	A
30 -031	38204-0002	......FRAME	1	B
30 -031	38204-0003	......FRAME	1	D

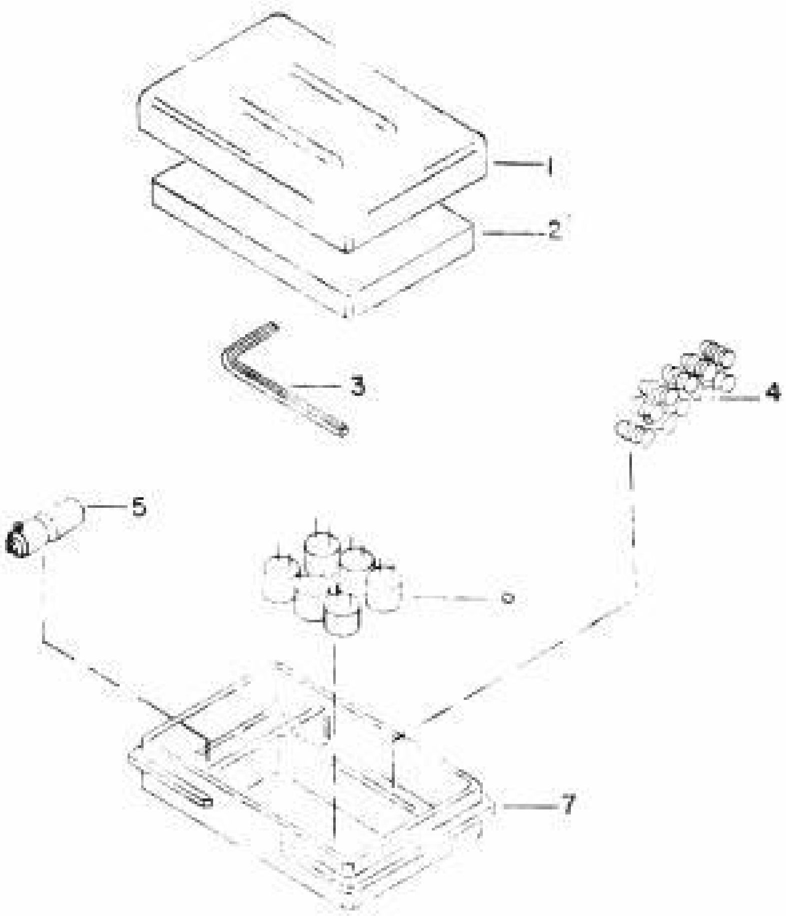


Figure 31. Running Spares Kit

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
		RUNNING SPARES KIT				
31 -000	30470-0007	..KIT RUN SPARES			REF	C
31 -001	30273	...BOX TOP			1	C
31 -002	30274	...PAD PLASTIC			1	C
31 -003	05028-0002	...WRENCH HEX SOC			1	C
31 -004	02225	...SPROCKET TEETH			10	C
31 -005	MS15571-2	...LAMP	05530-0019	96906	1	C
31 -006	05611-0008	...FUSE 1.5 AMP			6	C
31 -007	30272	...BOX BOTTOM			1	C

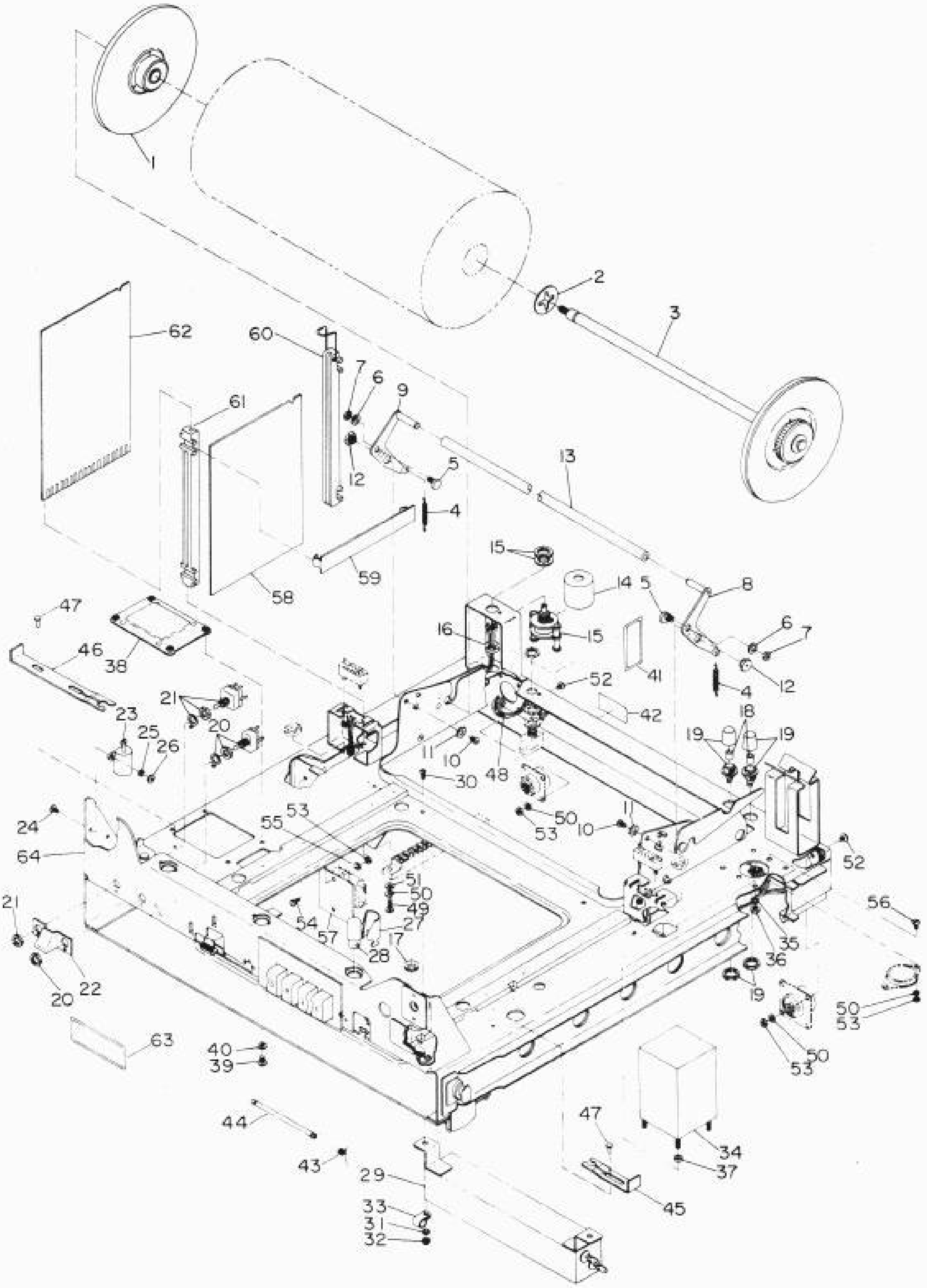


Figure 32. Chassis Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
		CHASSIS ASSEMBLY				
32 -000	37742-0002	..CHASSIS ASSY			1	A
32 -000	37743-0002	..CHASSIS ASSY			1	F
32 -001	03605	...DRUM ASSY			1	C
32 -002	03614	...DISC			1	C
32 -003	04852	...SHAFT ASSY			1	C
32 -004	03303	...SPRING			2	C
32 -005	03311	...BRAKE ASSY			2	C
32 -006	05006-0009	...WASHER LOCK			2	C
32 -007	05030-0003	...NUT HEX			2	C
32 -008	03527	...LINK ASSY RH			1	C
32 -009	03526	...LINK ASSY LH			1	C
		- - - AP - - -				
32 -010	05007-0040	...SCREW MACHINE			2	C
32 -011	1104-00	...WASHER LOCK	05006-0018	78189	2	C
		- - - * - - -				
32 -012	03308	...PIVOT			2	C
32 -013	03309	...TUBE			1	C
32 -014	38473	...SLEEVING INS			1	C
32 -015	38479	...SWITCH ROTARY			1	C
32 -016	05534-0019	...GROMMET			1	C
32 -017	05534-0021	...GROMMET			1	C
32 -018	05611-0008	...FUSE 0.10 AMPS			2	C
32 -019	42W	...FUSEHOLDER	05519-0007	71400	2	C
32 -020	05577-0017	...SWITCH TOGGLE			1	C
32 -021	05577-0015	...SWITCH TOGGLE			1	C
32 -022	36360	...GUARD SWITCH			1	C
32 -023	05618-10R0	...RESISTOR			1	E
		- - - AP - - -				
32 -024	05007-0068	...SCREW MACHINE			2	C
32 -025	AN935-2L	...WASHER LOCK	05006-0002	88044	2	C
32 -026	05030-0002	...NUT HEX			2	C
		- - - * - - -				
32 -027	37968	...DIFFUSER LAMP			3	C
32 -028	MS15571-2	...LAMP	05530-0019	96906	3	C
32 -029	37967	...CAPACITOR			1	C
		- - - AP - - -				
32 -030	05007-0051	...SCREW MACHINE			2	C
32 -031	05032-0004	...WASHER FLAT			2	C
32 -032	50 FA 440	...LOCK NUT	05016-0002	56878	2	C
		- - - * - - -				
32 -033	05551-0002	...CLAMP LOOP			2	C
32 -034	36481	...TRANSFORMER			1	C
		- - - AP - - -				
32 -035	AN935-4L	...WASHER LOCK	05006-0004	88044	4	C
32 -036	05030-0008	...NUT HEX			4	C
		- - - * - - -				
32 -037	38385	...SPACER			4	C
32 -038	04244	...SWITCH ASSY			1	A
		- - - AP - - -				
32 -039	05007-0016	...SCREW MACHINE			4	A
32 -040	05006-0009	...WASHER LOCK			4	A
		- - - * - - -				
32 -041	38391	...PLATE IDENT			1	C
32 -042	38403	...PLATE IDENT			1	C
32 -043	37165	...SPRING TORSION			4	C
32 -044	37164	...SHAFT SPRING			1	C
32 -045	03274	...LOCK SLIDE RH			1	C
32 -046	03275	...LOCK SLIDE LH			1	C
		- - - AP - - -				
32 -047	03273	...PIN SHOULDERED			2	C
		- - - * - - -				
32 -048	37499-0001	...HARN&COMP ASSY			1	A
32 -048	37499-0002	...HARN&COMP ASSY			1	F
		- - - AP - - -				
32 -049	05007-0089	...SCREW MACHINE			2	C
32 -050	AN935-4L	...WASHER LOCK	05006-0004	88044	12	C
32 -051	05032-0004	...WASHER FLAT			2	C

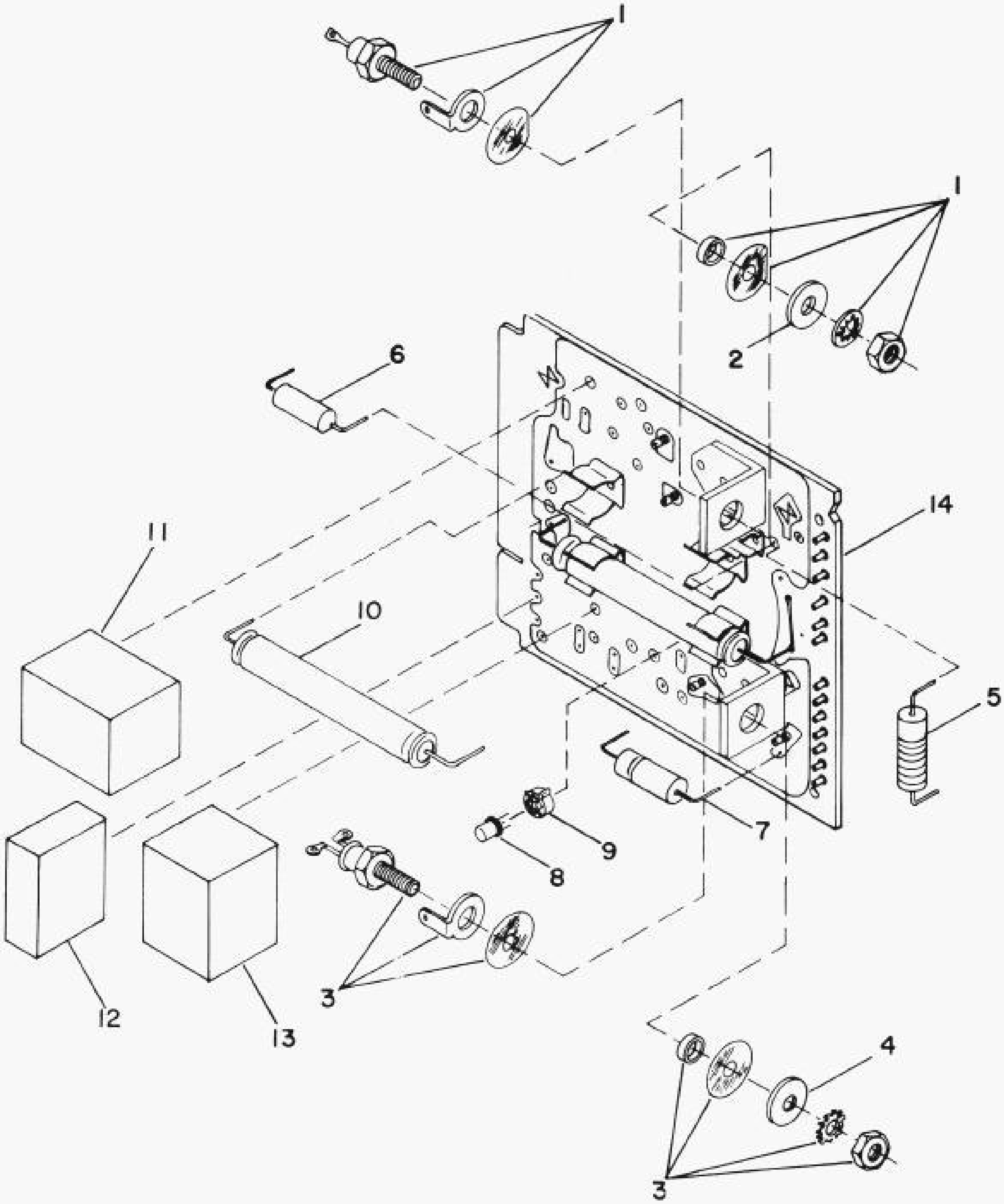


Figure 33. Module Assembly-Chassis

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
32 -052	05007-0024	...SCREW MACHINE			8	C
32 -053	05030-0010	...NUT HEX			12	C
32 -054	05045-0003	...SCREW MACHINE			2	C
32 -055	05006-0009	...WASHER LOCK			2	C
32 -056	05007-0002	...SCREW MACHINE			2	C
32 -057	04205	...INSULATOR			1	C
32 -058	38390	...INSULATOR			1	C
32 -059	38237	...GUIDE SUPPORT			1	C
32 -060	38289	...LATCH ASSY CB			1	C
32 -061	05227-0001	...GUIDE SUPPORT			1	C
32 -062	37148	...MODULE ASSY			1	C
32 -063	38475-0001	...PLATE IDENT			1	A
32 -063	38475-0002	...PLATE IDENT			1	F
32 -064	37147-0002	...CHASSIS			1	C

MODULE ASSEMBLY CHASSIS

33 -000	37148	...MODULE ASSY			REF	C
33 -001	1N2986B	....DIODE SEMI COND	05561-0018	81349	1	C
33 -002	MS27183-208	....WASHER FLAT	05032-0028	96906	1	C
33 -003	2N1771A	....DIODE SEMI COND	05610-0003	81349	1	C
33 -004	MS27183-208	....WASHER FLAT	05032-0028	96906	1	C
33 -005	RC42GF470J	....RESISTOR	05504-470J	81349	1	C
33 -006	RWP20F1690F	....RESISTOR	05629-1690	81349	1	C
33 -007	CL65CH680KP3	....CAPACITOR	05586-0014	83149	1	C
33 -008	2N930	....DIODE SEMI COND	05508-0022	81349	1	C
33 -009	05533-0005	....TRANSIPAD			1	C
33 -010	05586-0015	....CAPACITOR			2	C
33 -011	37142	....MODULE LINE SEN			1	C
33 -012	37144	....MODULE PWR SUP			1	C
33 -013	37143	....MODULE MOT STOP			1	C
33 -014	38375	....BOARD PRINT CKT			1	C

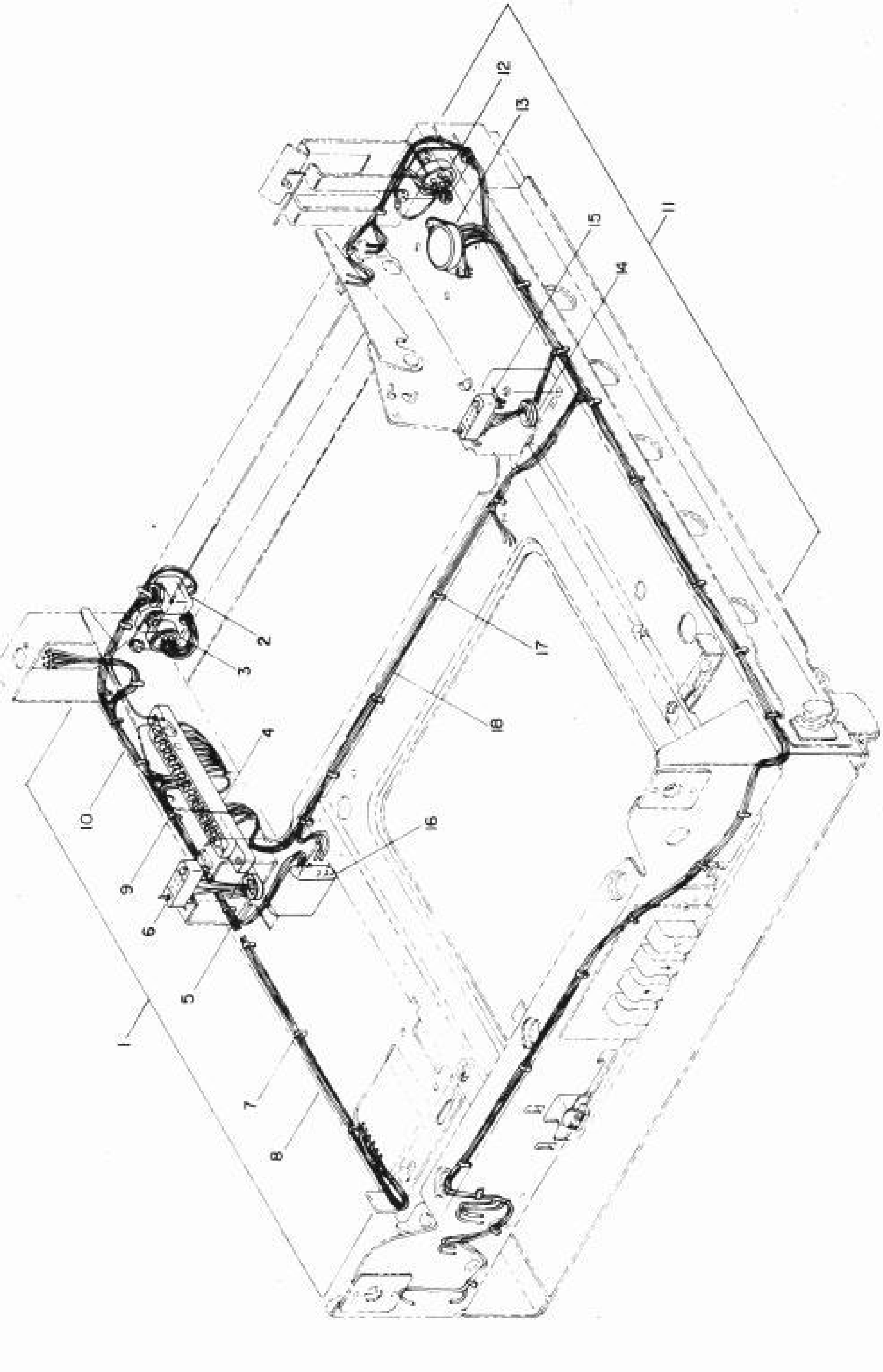


Figure 34. Harness Assembly-Chassis

HARNESS ASSEMBLY CHASSIS

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
34 -000	37499-0001	...HARN&COMP ASSY			REF	A
34 -000	37499-0002	...HARN&COMP ASSY			REF	F
34 -001	38302	....HARNESS ASSY			1	A
34 -001	38405	....HARNESS ASSY			1	F
34 -002	05577-0016	.....SWITCH TOGGLE			1	C
34 -003	MS3112E12-10P	.....CONNECTOR	05511-0183	96906	1	C
34 -004	05511-0187	.....CONNECTOR			1	C
34 -005	05534-0023	.....GROMMET			1	C
34 -006	05511-0132	.....CONNECTOR			1	C
34 -007	TY-23M	.....CLAMP TY	05605-0004	59730	19	A
34 -008	38267	.....HARNESS			1	A
34 -009	TY-23M	.....CLAMP TY	05605-0004	59730	15	F
34 -010	38404	.....HARNESS			1	F
34 -011	38303	....HARNESS ASSY			1	C
34 -012	MS3112E14-5P	.....RECEPTACLE	05511-0189	96906	1	C
34 -013	05513-0002	.....CONNECTOR			1	C
34 -014	05534-0023	.....GROMMET			1	C
34 -015	05511-0132	.....CONNECTOR			1	C
34 -016	36744	.....RELAY			1	C
34 -017	TY-23M	.....CLAMP TY	05605-0004	59730	40	C
34 -018	38268	.....HARNESS			1	C

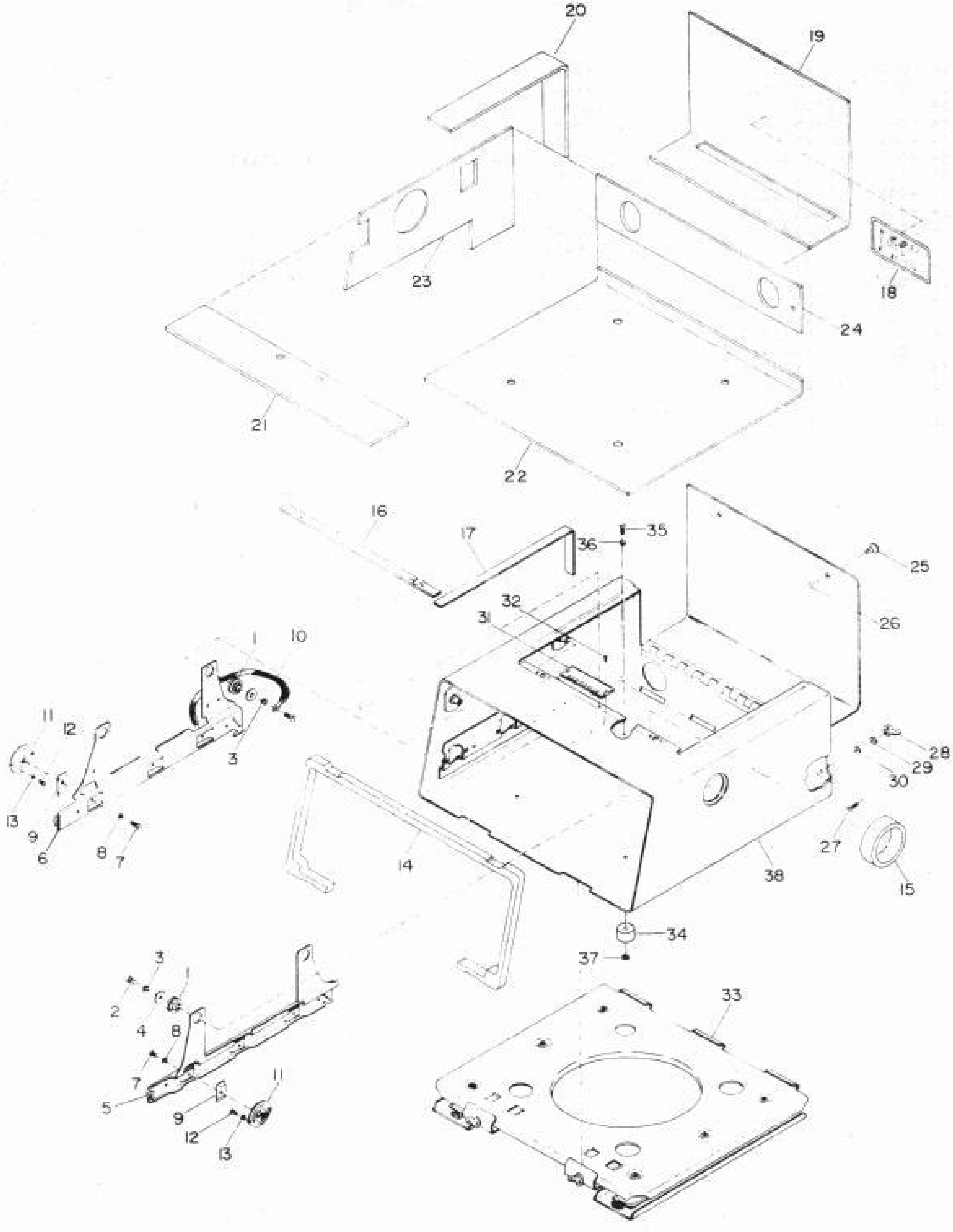


Figure 35. Non-Tactical Case Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
		NON-TACTICAL CASE ASSEMBLY				
35 -000	37440-0002	..CASE ASSY			REF	C
35 -001	05534-0008	...RUBBER GROMMET			4	C
35 -002	05007-0024	...SCREW MACHINE			4	C
35 -003	AN935-4L	...WASHER LOCK	05006-0004	88044	4	C
35 -004	30498	...WASHER FLAT			4	C
35 -005	04224	...MOUNT ASSY RH			1	C
35 -006	37983	...MOUNT ASSY LH			1	C
		- - - AP - - -				
35 -007	05007-0151	...SCREW MACHINE			6	C
35 -008	AN935-8L	...WASHER LOCK	05006-0017	88044	6	C
		- - - * - - -				
35 -009	04505	...SNUBBER			6	C
35 -010	38088	...GROUND STRAP			2	C
35 -011	04199	...VIBRATION INS			6	C
		- - - AP - - -				
35 -012	05007-0133	...SCREW MACHINE			12	C
35 -013	AN935-5L	...WASHER LOCK	05006-0005	88044	12	C
		- - - * - - -				
35 -014	04289	...DUST SEAL			1	C
35 -015	03724	...DUST SEAL			1	C
35 -016	04215	...COVER SEAL			1	C
35 -017	04214	...R H COVER SEAL			2	C
35 -018	38032	...PLATE INSTRUCT			1	C
35 -019	38234	...LINER			1	C
35 -020	38233	...LINER			2	C
35 -021	04216	...LINER			1	C
35 -022	30493	...LINER			1	C
35 -023	38232	...LINER			2	C
35 -024	38235	...LINER			1	C
35 -025	05090-0003	...FASTENER				
35 -026	05099-0001	...RING RETAINING			2	C
35 -027	05007-0209	...SCREW MACHINE			1	C
35 -028	MS35426-15	...NUT WING	05524-0001	96906	1	C
35 -029	05030-0004	...NUT HEX			1	C
35 -030	05032-0028	...WASHER FLAT			1	C
35 -031	03810-0015	...PLATE IDENT			1	
		- - - AP - - -				
35 -032	05007-0024	...SCREW MACHINE			2	C
		- - - * - - -				
35 -033	36672	...MOUNT SHOCK			1	C
35 -034	05066-0005	...BUMPERS			4	C
		- - - AP - - -				
35 -035	05007-0151	...SCREW MACHINE			4	C
35 -036	AN935-8L	...WASHER LOCK	05006-0017	88044	4	C
35 -037	05030-0015	...NUT HEX			4	C
		- - - * - - -				
35 -038	37498	...CASE			1	C

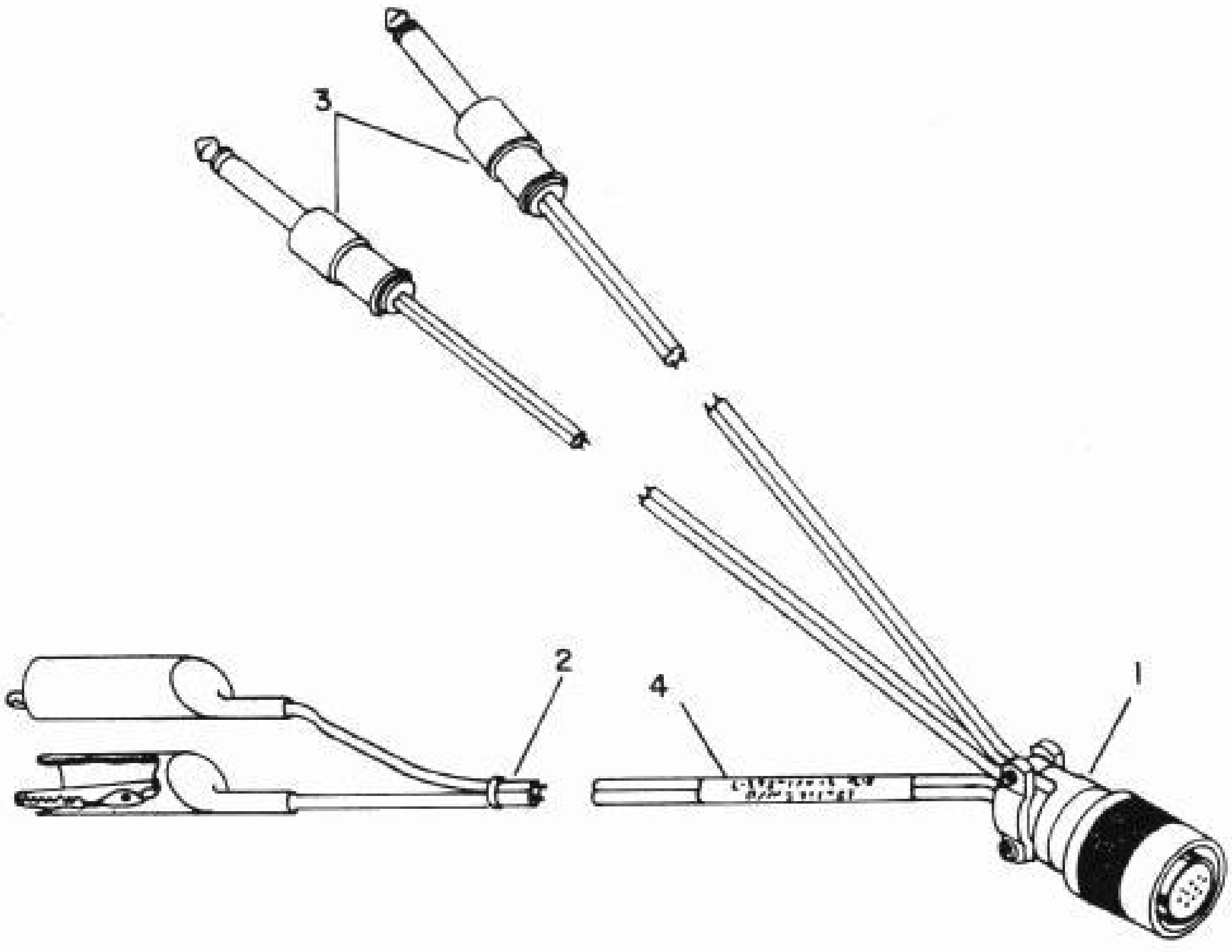


Figure 36. Bench Test Cable-Signal

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		BENCH TEST CABLE,SIGNAL		
36 -000	38558	..BENCH CABLE SIG	1	C
36 -001	MS3116F12-10S	...CONNECTOR 05511-0190 96906	1	C
36 -002	05564-0021	...ZIP CORD	1	C
36 -003	05564-0019	...ZIP CORD	1	C
36 -004	05209-0009	...MARKER	1	C

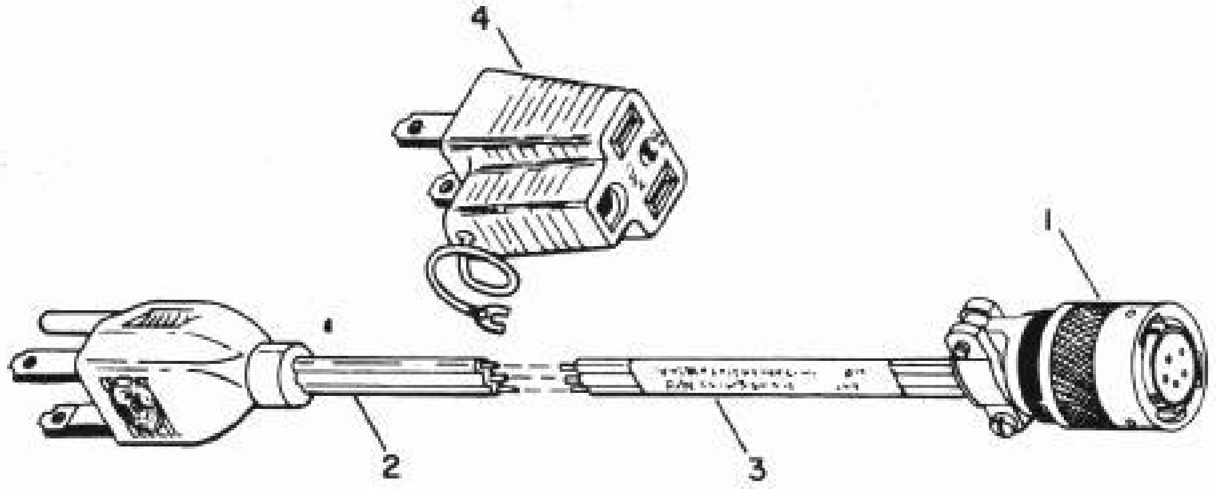


Figure 37. Bench Test Cable-Power

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		BENCH TEST CABLE POWER		
37 -000	38557	..BENCH CABLE PWR	1	C
37 -001	MS3116F14-5S	...CONNECTOR 05511-0188 96906	1	C
37 -002	05564-0020	...ZIP CORD	1	C
37 -003	05209-0008	...MARKER	1	C
37 -004	419	...ADAPTER 05511-0166 72041	1	C

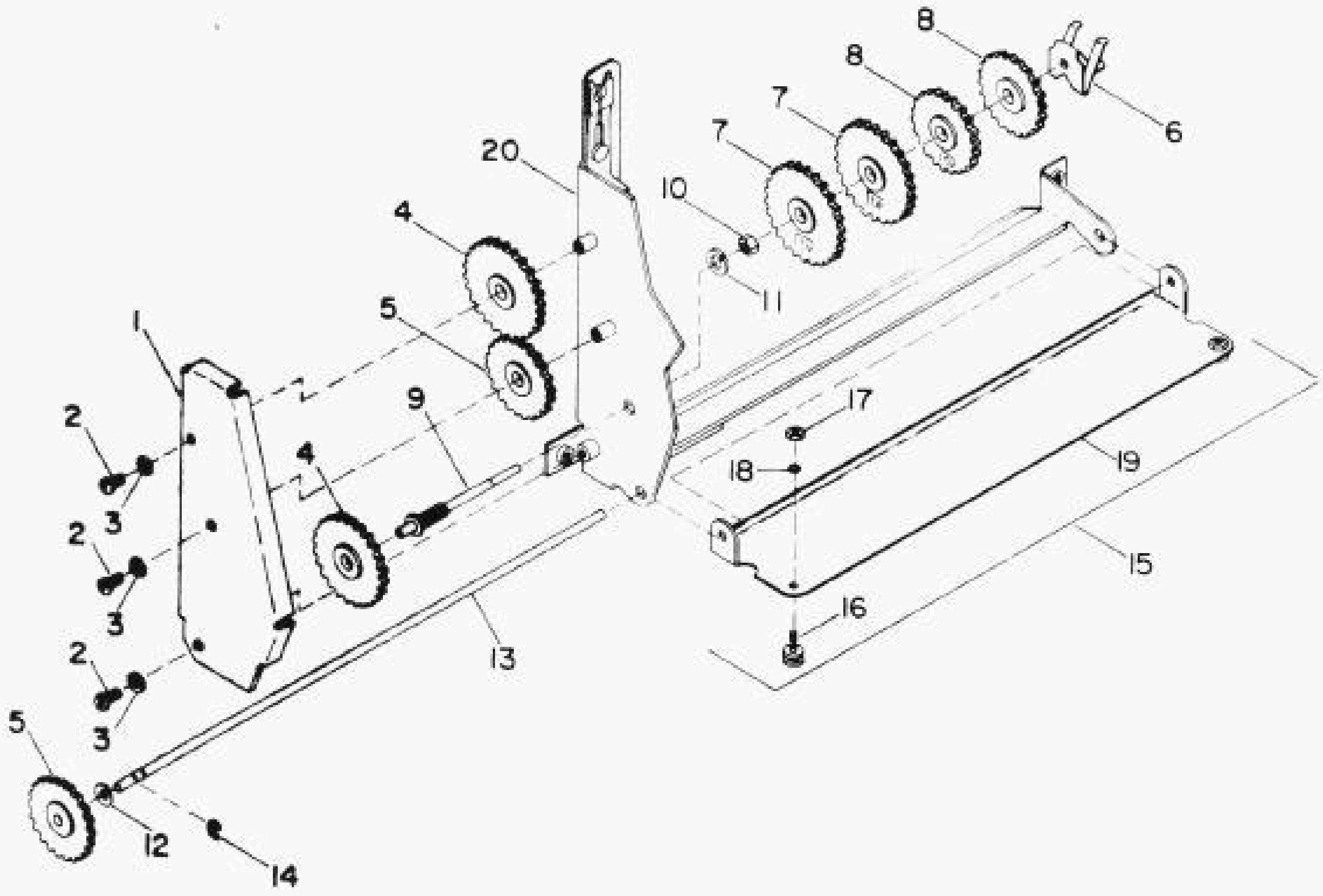


Figure 38. Remote Drive Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		REMOTE DRIVE ASSEMBLY		
38 -000	37200	..MAINT FIXTURE	1	A
38 -001	37196	...COVER	1	A
		- - - AP - - -		
38 -002	05007-0016	...SCREW MACHINE	3	A
38 -003	AN935-4L	...WASHER LOCK 05006-0004 88044	3	A
		- - - • - - -		
38 -004	37192	...GEAR 7.42	2	A
38 -005	37193	...GEAR 7.42	2	A
38 -006	05144-0002	...SPEED CLIP	1	A
38 -007	37194	...GEAR 7.0	2	A
38 -008	37195	...GEAR 7.0	2	A
38 -009	37531	...PIVOT STUD	1	A
		- - - AP - - -		
38 -010	05030-0028	...NUT HEX	1	A
38 -011	05006-0023	...WASHER LOCK	1	A
		- - - • - - -		
38 -012	03013	...SPACER	1	A
38 -013	37186	...SHAFT PIVOT	1	A
38 -014	05004-0022	...RING RETAINING	2	A
38 -015	37198	...BKT MTG	1	A
38 -016	37165	....STUD	2	A
38 -017	05030-0008	....NUT HEX	2	A
38 -018	05006-0006	....WASHER LOCK	2	A
38 -019	37184	....BRACKET	1	A
38 -020	37197	...BRACKET	1	A

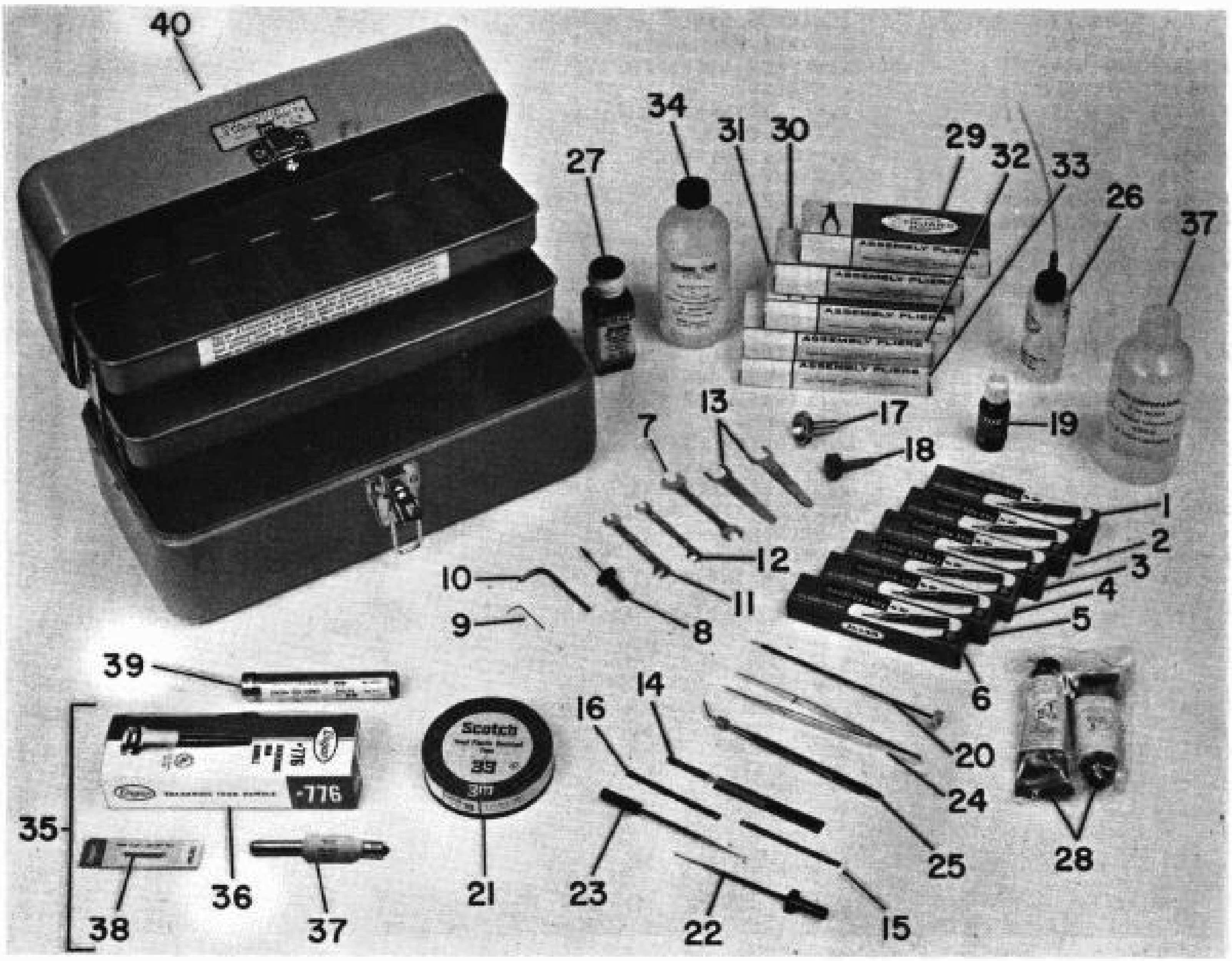


Figure 39. Maintenance Kit

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7			UNITS PER ASSY	USABLE ON CODE
		MAINTENANCE KIT				
39 -000	07140	.MAINTENANCE KIT			1	C
39 -001	607-1/16	..KEY AND HANDLE	05120-0001	70276	1	C
39 -002	607-5/64	..KEY AND HANDLE	05120-0002	70276	1	C
39 -003	607-3/32	..KEY AND HANDLE	05120-0003	70276	1	C
39 -004	607-7/64	..KEY AND HANDLE	05120-0004	70276	1	C
39 -005	607-0.050	..KEY AND HANDLE	05120-0005	70276	1	C
39 -006	607-0.035	..KEY AND HANDLE	05120-0006	70276	1	C
39 -007	05029-0005	..WRENCH,3/8&5/16			1	C
39 -008	08141	..SCREWDRIVER			1	C
39 -009	0.035X1-1/4	..KEY	05122-0001	70276	1	C
39 -010	1/8X2-1/4	..KEY	05122-0002	70276	1	C
39 -011	05029-0001	..WRENCH 3/16			1	C
39 -012	05029-0002	..WRENCH 1/4			1	C
39 -013	02241	..WRENCH SPL			2	C
39 -014	3-316	..BURNISHER	05136-0002	04563	1	C
39 -015	04554	..GAGE,0.008			1	C

39 -016	02673	..GAGE,0.031			1	C
39 -017	04533	..CRANK,HANDWHEEL			1	C
39 -018	04534	..WRENCH,SOC,3/16			1	C
39 -019	TYPE C	..SEALANT	05149-0002	05972	1	C
39 -020	04535	..KEY,1/16X6 IN			1	C
39 -021	33	..TAPE,ELEC.	05036-0011	76381	1	C
39 -022	34932	..HOOK,SPG,PULL			1	C
39 -023	34933	..HOOK,SPG,PUSH			1	C
39 -024	05037-0002	..TWEEZER,STR			1	C
39 -025	05037-0003	..TWEEZER,BENT			1	C
39 -026	05207	..APPLICATOR,OIL			1	C
39 -027	90-1/2	..VARNISH,INS,RED	05213-0001	72653	1	C
39 -028	05041-0001	..GREASE			2	C
39 -029	1-45 DEG BEND	..PLIERS,RET RING	05035-0006	79136	1	C
39 -030	018	..PLIERS,RET RING	05035-0011	79136	1	C
39 -031	012	..PLIERS,RET RING	05035-0010	79136	1	C
39 -032	520-45 DEG BEN	..PLIERS,GRIP R	05035-0003	79136	1	C
39 -033	520-45 DEG BEN	..PLIERS,GRIP R	05035-0003	79136	1	C
39 -034	37253	..SOLVENT,C			1	C
39 -035	05544-0001	..SOLDERING IRON			1	C
39 -036	776	...SOLDER HANDLE	05544-0002	78976	1	C
39 -037	4035	...SOLDER ELEMENT	05544-0003	78976	1	C
39 -038	PL-331	...SOLDERING TIP	05544-0004	78976	1	C
39 -039	05140-0001	..SOLDER 60-40			1	C
39 -040	34304	..OIL,LUB			1	C
39 -041	05178	..BOX,MAINT.KIT			1	C

SECTION II

NUMERICAL INDEX

PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE	PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE	PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE
AN935-4L	03 -055			00625	05 -015	N FFC		00873	03 -128	X1FTC	
AN935-10L	03 -148	P2FFC		00630	07 -008	P2FFC		00874	03 -129	X1FTC	
AN935-10L	18 -003			00632	03 -066	P2FFC		00875	03 -130	X1FTC	
AN935-2L	04 -005	P2FFC		00646	05 -003	P2FFC		00876	03 -131	X1FTC	
AN935-2L	04 -032	P2FFC		00649	03 -092	P2FFC		00877	03 -132	X1FTC	
AN935-2L	19 -089			00655	05 -010	P2FFC		00878	03 -133	X1FTC	
AN935-2L	21 -015			00656	05 -014	P2FFC		00879	03 -134	X1FTC	
AN935-2L	27 -042			00660	05 -002			00880	03 -111	X1FTC	
AN935-2L	32 -025			00660	05 -005	N FFC		00881	03 -113	X1FTC	
AN935-3L	03 -036	P2FFC		00674	03 -152	P2FFC		00882	03 -114	X1FTC	
AN935-3L	20 -056			00677	05 -009	N FFC		00883	03 -115	X1FTC	
AN935-3L	29 -015			00710	07 -011	P2FFC		00884	03 -116	X1FTC	
AN935-4L	03 -005	P2FFC		00711	03 -107	P2FFC		00885	03 -117	X1FTC	
AN935-4L	03 -009	P2FFC		00713	03 -164	X1FFC		00886	03 -118	X1FTC	
AN935-4L	03 -051	P2FFC		00722	04 -036	X1FFC		00887	03 -119	X1FTC	
AN935-4L	03 -078	P2FFC		00724	04 -002	P2FFC		00888	03 -120	X1FTC	
AN935-4L	03 -109			00724	27 -008			00889	03 -121	X1FTC	
AN935-4L	03 -166	P2FFC		00725	07 -017	P2FFC		00890	03 -122	X1FTC	
AN935-4L	06 -003	P2FFC		00726	03 -150	P2FFC		00891	03 -091	X1FTC	
AN935-4L	09 -012	P2FFC		00727	03 -151	P2FFC		00892	03 -135		
AN935-4L	10 -054	P2FFC		00731	03 -047			00893	03 -123	A FTC	
AN935-4L	13 -010	P2FFC		00731	03 -084	P2FFC		00894	03 -110	A FTC	
AN935-4L	18 -007	P2FFC		00734	03 -046	P2FFC		00899	03 -041	P2FFC	
AN935-4L	32 -035			00736	11 -001	P2FFC		00929	03 -156	P2FFC	
AN935-4L	32 -050			00736	04 -030	P2FFC		00930	03 -157	P2FFC	
AN935-4L	35 -003			00750	07 -001	P2FFC		00931	03 -158	P2FFC	
AN935-4L	38 -003			00769	03 -017			00932	03 -155	P2FFC	
AN935-5L	01 -016	P1FFC		00775	07 -012	A FFR		00933	03 -160	P2FFC	
AN935-5L	35 -013			00776	03 -049	P2FFC		00936	03 -100	P1FFC	
AN935-8L	35 -008			00791	07 -015	P2FFC		00940	03 -029	P2FFC	
AN935-8L	35 -036			00805	04 -025	P2FFC		00941	03 -154	P2FFC	
CL65CFA80KP3	33 -007			00806	04 -022	P1FFC		00944	03 -162	P2FFC	
MS15571-2	31 -005	P1FFC		00807	04 -019	P2FFC		00946	03 -076	N FFC	
MS15571-2	32 -028			00808	04 -016	P2FFC		00951	03 -057	P2FFC	
MS27183-20B	33 -002			00809	04 -013	P2FFC		00951	03 -056		
MS27183-20F	33 -004			00810	04 -010	P2FFC		00956	03 -059	P2FFC	
MS3112E12-10P	34 -003			00811	04 -033	X1FFC		00958	03 -088	P2FFC	
MS3112E14-5P	34 -012	P1FFC		00815	04 -034	N FFC		00960	03 -018		
MS3116F12-10S	01 -001	P1FFC		00815	19 -043			00961	03 -024	P2FFC	
MS3116F12-10S	36 -001			00815	19 -050			00962	03 -077	P2FFC	
MS3116F14-5S	01 -002	P1FFC		00819	07 -021	P2FFC		00963	07 -005	N FFC	
MS3116F14-5S	37 -001			00824	03 -073			00971	03 -034	P2FFR	
MS35426-13	35 -028			00824	03 -095	P2FFC		00983	07 -018	A FFR	
PL-331	39 -038			00824	13 -007			00990	03 -042	P2FFC	
PL42GF470J	33 -005			00824	27 -020			00996	03 -037	P2FFC	
RS-50	27 -050	P2FFC		00824	27 -029			01103	29 -009	P2FFC	
RS-50	27 -059			00824	27 -037			01104	29 -036	P2FFC	
RS-62	27 -052	P2FFC		00831	03 -153	P2FFC		01106	29 -039	P2FFC	
RWP2CF1690F	33 -006	P1FFC		00833	03 -101	P2FFC		01106	29 -045		
TY-23M	34 -007			00835	03 -090	P2FFR		01106	29 -052		
TY-23M	34 -009			00847	03 -079	P2FFC		01106	29 -060		
TY-23M	34 -017			00852	03 -137	P2FFC		01108	29 -064	P2FFC	
TYPE C	39 -019			00853	03 -125	P2FFC		01108	29 -091		
C.L35X1-1/4	39 -004			00854	03 -112	P2FFC		01114	29 -005	P2FFR	
00201	04 -024	P2FFR		00855	05 -011	N FFC		01116	29 -036	P2FFC	
00202	03 -147	P2FFC		00860	03 -136	X1FTC		01116	29 -041		
00203	07 -004	A FFR		00861	03 -138	X1FTC		01116	29 -048		
00204	03 -085	P2FFC		00862	03 -139	X1FTC		01116	29 -056		
00205	03 -058	A FFR		00863	03 -140	X1FTC		01116	29 -080		
00221	22 -001	P2FFC		00864	03 -141	X1FTC		01116	29 -087		
00221	22 -039			00865	03 -142	X1FTC		01117	29 -093	P2FFC	
00610	04 -011	P2FFC		00866	03 -143	X1FTC		01120	29 -010	P2FFC	
00610	04 -014			00867	03 -144	X1FTC		01122	25 -008	N FFC	
00610	04 -017			00868	03 -145	X1FTC		01123	29 -035	P2FFR	
00610	04 -020			00869	03 -146	X1FTC		01124	20 -059	X1FFC	
00610	04 -023			00870	03 -124	X1FTC		01126	23 -043	P2FFC	
00610	04 -026			00871	03 -126	X1FTC		01126	24 -033		
00616	03 -060	P2FFC		00872	03 -127	X1FTC		01153	29 -032	P2FFC	

PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE	PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE	PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE
01154	19 -099	P2FFC		01673	25 -014			02408	19 -003	N FFC	
01160	19 -031	P2FFR		01673	29 -007			02439	24 -004	N FFC	
01163	19 -063	P1FFC		01674	22 -045	A FFR		02485	09 -016	A FFR	
01166	27 -051	N FFC		01676	20 -033	N FFC		02507	22 -043	P2FFC	
01174	27 -060	P2FFC		01677	22 -038	P2FFC		02508	22 -042	A FFR	
01175	09 -014	P2FFC		01678	22 -037	P2FFC		02509-0001	30 -013		
01179	27 -054	P1FFC		01680	22 -035	P2FFC		02509-0001	23 -044	N FFC	
01183	27 -061	N FFC		01681	22 -034	P2FFC		02510-0001	30 -022	P2FFC	
012	39 -031			01682	22 -033	P2FFC		02523	25 -003	P2FFC	
01205-0001	05 -012	P2FFC		01684	22 -011	P2FFC		02523	26 -016		
01205-0001	25 -028	P2FFC		01684	22 -026			02530	27 -062	P2FFC	
01205-0001	26 -011			01685	22 -063	N FFC		02531	27 -063	P2FFC	
01205-0002	26 -012	P2FFC		01686	22 -054	P2FFC		02533	09 -006	P2FFC	
01210	25 -019	P2FFC		01688	20 -006	P2FFC		02538-0003	09 -007	P2FFC	
01211	25 -020	P2FFC		01689	22 -009	P1FFC		02542	27 -022	P2FFC	
01212	25 -021	P2FFC		01692	22 -016	P2FFC		02546	28 -013		
01213	25 -022	P2FFC		01698	22 -005	P2FFC		02547	28 -014		
01214	25 -023	P2FFC		01699	22 -004	P2FFC		02559	17 -065	P2FFC	
01215	25 -024	P2FFC		01700	22 -008	P2FFC		02572	29 -053	P2FFC	
01216	26 -004	P2FFC		01701	20 -008	P1FFC		02575	29 -047	P2FFR	
01217	26 -005	P2FFC		01718	21 -003	P2FFC		02589	29 -061	P2FFC	
01218	26 -006	P2FFC		01730	19 -010	P2FFC		02590	29 -055	P2FFR	
01219	26 -007	P2FFC		01731	19 -014	P1FFC		02591	29 -086	P2FFR	
01221	25 -030	P2FFC		01741	20 -015	P2FFC		02592	29 -092	P2FFC	
01222	26 -017	P2FFC		01744	20 -001	P2FFC		02599	29 -079	P2FFR	
01223	23 -006	P2FFC		01745	18 -010	P2FFC		02600	29 -085	P2FFC	
01235	25 -029	N FFC		01748	23 -003	N FFC		02602	29 -040	P2FFR	
01235	26 -003			01750	19 -005	P1FFC		02605	29 -046	P2FFC	
01237	26 -013	P2FFC		01756	18 -019	P1FFC		02610	29 -065	P2FFC	
01246	23 -005	P2FFC		018	39 -030			02611	29 -097	P2FFC	
01250	17 -022	N FFC		01800	10 -025	P2FFC		02612	29 -030	P2FFR	
01253	13 -012			01802	10 -024	P1FFC		02622	17 -001	P2FFC	
01254	29 -021	P2FFC		01850	29 -001	P2FFC		02623	17 -005		
01255	15 -001	P2FFC		01852	29 -029	P1FFC		02624	17 -003	P2FFC	
01261	10 -045	P2FFC		01854	24 -002	N FFC		02662	19 -023	P2FFC	
01262	13 -001	P2FFC		01856	24 -001	N FFC		02673	39 -016		
01265	29 -013	A FFR		01866	23 -007	N FFC		02726	19 -103	P2FFC	
01266	29 -027	P2FFC		01884-0002	08 -006	N FFC		02728	19 -101	P2FFC	
01268	29 -024	P2FFC		01885	08 -004	P2FFC		02744	19 -097	P1FFC	
01269	29 -017	P2FFC		01887	23 -010	P2FFC		02783	10 -036		
01270	26 -015	P2FFC		01916	23 -013	N FFC		02841	23 -040		
01278-0001	27 -055	A FFR		01917	20 -004	P2FFC		02841	24 -024		
01280-0001	27 -047	P2FFC		01921	20 -018	P1FFC		02841	24 -035		
01281	27 -058	P2FFC		01922	20 -019	P2FFC		02842	19 -100	P2FFC	
01284-0004	19 -104	P2FFR		01949	27 -006	P2FFC		02843	09 -020	P2FFC	
01311	22 -047	P2FFC		01950	27 -023	P2FFC		02843	28 -006		
01323	25 -001	P2FFC		01954-0002	27 -013	P2FFC		02921	29 -023		
01332	18 -012	P2FFC		01955	27 -025	N FFC		02922	29 -022	P2FFC	
01347	26 -001	P2FFC		01960	27 -007	P1FFC		03004	21 -001	P2FFC	
01349	29 -026	P2FFC		01965-0002	01 -010	A FFR		03007	20 -065	P2FFC	
01362	23 -049	N FFC		01965-0002	08 -000			03012	29 -028		
01362	30 -018			01968	15 -006	P2FFC		03013	38 -012		
01363	23 -047	N FFC		01969	08 -001	P1FFC		03024	23 -012	P2FFC	
01363	30 -010			02005	10 -046	P1FFC		03038	11 -002	N FFC	
01363	30 -016			02009	13 -019	P1FFC		03056-0002	09 -004	N FFC	
01368	19 -001	P2FFC		02015	19 -096	P2FFC		03068	25 -017	N FFC	
01376	23 -033	P2FFC		02018	22 -014	P2FFC		03134	29 -019		
01393	19 -006	P2FFC		02019	22 -024	P2FFC		03141	19 -070	P2FFC	
01399	19 -024	P2FFC		02020	22 -018	P2FFC		03141	20 -014		
01402	10 -037	P1FFC		02020	22 -022			03146	20 -039	P2FFC	
01407-0002	18 -016	P2FFC		02020	22 -028			03147	24 -006	P1FFC	
01425	19 -051	N FFC		02021	22 -020	P2FFR		03159	18 -024		
01426	25 -027	P2FFC		02028	25 -011	P2FFR		03159	19 -072		
01426	26 -010			02029	25 -016	X1FFC		03159	23 -017		
01501	10 -014	P2FFC		02030	22 -052	P2FFC		03159	24 -027		
01510	29 -002	P2FFC		02073-0003	19 -095	A FFR		03159	23 -029		
01526	25 -007	P2FFC		02086	27 -031	P1FFC		03161	19 -073		
01578	28 -011	N FFC		02090	22 -049	A FFR		03161	23 -018		
01589	28 -010	P1FFC		02093	30 -001	P2FFC		03161	23 -030		
01592	28 -001	N FFC		02095	23 -045	P2FFC		03163	24 -005	P2FFC	
01597	27 -001	A FFR		02095	30 -006			03173	16 -009	P2FFC	
01600	19 -054	X1FFC		02095	30 -014			03181	19 -106		
01600	20 -053			02105	19 -022	P2FFC		03186	29 -042	P1FFC	
01601	20 -057	X1FFC		02106	18 -014	P2FFC		03186	29 -049		
01606	20 -058	X1FFC		02106	19 -021	X1FFC		03186	29 -057		
01607	20 -013	P2FFC		02136	22 -053	P2FFC		03186	29 -081		
01607	20 -041			02137	30 -029	N FFC		03186	29 -088		
01612	22 -060	N FFC		02189	29 -011	P2FFC		03186	29 -094		
01614	30 -002	P2FFC		02194	29 -012	P2FFC		03206	19 -037	P2FFC	
01624	22 -062	P2FFC		02225	31 -004	P1FFC		03209	19 -038	P2FFC	
01628	30 -004	P2FFC		02241	39 -013			03212	17 -034	P2FFC	
01630-0003	20 -051	P2FFR		02244	16 -001	P2FFC		03219	19 -052	P1FFC	
01656	22 -010	P2FFC		02249	27 -032	P2FFC		03251	23 -038	P2FFC	
01663	17 -012	P2FFR		02307	19 -075	P2FFC		03252	23 -035	P2FFC	
01664	19 -092	A FFR		02309	19 -068	P2FFC		03258	22 -006		
01666	22 -013	N FFC		02312	19 -067	P1FFC		03261	12 -001	P2FFC	
01668	22 -048	P2FFC		02374	29 -039	P2FFC		03273	32 -047	P2FFC	
01673	19 -036	P2FFC		02379	19 -015	P2FFC		03274	32 -045	P2FFC	
01673	22 -003			02381	19 -008	N FFC		03275	32 -046	P2FFC	
01673	22 -041			02385	19 -107	X1FFC		03280	23 -041	P1FFC	

PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE	PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE	PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE
03280	24 -023			04624	27 -012			05004-0042	24 -018	P2FFC	
03280	24 -034			04661-0001	03 -010	A FFR		05004-0042	24 -032		
03303	32 -004	P2FFC		04663	27 -011			05004-0043	24 -003	P2FFC	
03308	32 -012	P2FFC		04665	29 -069	P2FFC		05004-0044	03 -102	P2FFC	
03309	32 -013	P2FFC		04723	09 -010	X1FFC		05004-0045	21 -007		
03311	32 -005	P2FFC		04801	29 -066	P2FFC		05004-0045	21 -010		
03356-0001	02 -001	P2FFC		04803	29 -096	P2FFC		05004-0045	21 -012	P2FFC	
03357	02 -021	M TTC		04804	27 -004	P2FFC		05006-0002	01 -009		
03359	02 -002	P2FFC		04807	16 -007	N FFC		05006-0004	23 -020		
03369	02 -003	M FFC		04810	30 -026	P2FFC		05006-0005	20 -031		
03387	02 -005	P2FFC		04811-0002	08 -003			05006-0006	01 -012	N FFC	
03395	02 -020	P2FFC		04812	30 -019	P2FFC		05006-0006	09 -009		
03399	02 -014	M FFC		04813	19 -062	P2FFC		05006-0006	38 -018		
03416	09 -023	P2FTR		04815	19 -039	P2FFC		05006-0009	03 -026		
03417	09 -003	P2FFC		04816	19 -033	P2FFC		05006-0009	03 -031		
03423	09 -022	N FFC		04818	19 -094	P2FFC		05006-0009	03 -039	P2FFC	
03520	27 -053	P2FFC		04819	19 -019	P2FFC		05006-0009	03 -081		
03526	32 -009	P2FFC		04820	19 -027	P2FFC		05006-0009	03 -163		
03527	32 -008	P2FFC		04822	19 -079	P2FFC		05006-0009	07 -003		
03567-0011	03 -001	N FFC		04823	19 -074	P2FFC		05006-0009	07 -007		
03577-0003	17 -018			04825	27 -016	X1FFC		05006-0009	07 -010		
03605	32 -001	N FFC		04827	17 -014	P2FFC		05006-0009	07 -017		
03614	32 -002	N FFC		04837	04 -012	P2FFC		05006-0009	07 -025		
03625-0001	02 -008	N FFC		04838	04 -015	P2FFC		05006-0009	10 -019		
03628	02 -009	M FTC		04839	04 -018	P2FFC		05006-0009	11 -004		
03629	02 -010	P2FFC		04840	04 -021	P2FFC		05006-0009	19 -053		
03651	19 -109	X1FFC		04841	04 -024	P2FFC		05006-0009	30 -021		
03652	19 -108	P2FFC		04842	04 -027	P2FFC		05006-0009	32 -006		
03653	19 -066	P2FFC		04852	32 -003	P2FFC		05006-0009	32 -040		
03653	29 -063			05003-0001	19 -061	P2FFC		05006-0009	32 -055		
03655	25 -010	P1FFC		05004-0003	03 -070	P2FFC		05006-0016	30 -024	N FFC	
03657	04 -009	P2FFC		05004-0003	10 -035			05006-0020	28 -003		
03657	17 -021			05004-0003	13 -002			05006-0023	38 -011		
C3657	29 -067			05004-0004	24 -015			05006-0024	24 -037		
03658	19 -017	P2FFC		05004-0004	24 -029			05006-0024	24 -040	N FFC	
03658	27 -039			05004-0005	25 -002	P2FFC		05006-0024	27 -003		
03658	29 -004			05004-0011	24 -011			05007-0001	03 -038	P2FFC	
03660	03 -064	P1FFC		05004-0012	22 -012			05007-0002	03 -035	P2FFC	
03660	19 -029			05004-0012	22 -015			05007-0002	10 -033		
03660	19 -030			05004-0012	22 -017			05007-0002	20 -055		
03661	26 -008	P2FFC		05004-0012	22 -019			05007-0002	29 -014		
03662	03 -065	P1FFC		05004-0012	22 -021			05007-0002	32 -056		
03667	19 -009	P2FFC		05004-0012	22 -023			05007-0003	28 -002		
03668	29 -034	P1FFC		05004-0012	22 -025			05007-0005	10 -005	P2FFC	
03724	35 -015			05004-0012	22 -027			05007-0006	03 -011	P2FFC	
03755	09 -008			05004-0012	22 -029			05007-0009	08 -005	P2FFC	
03804	07 -026	P2FFC		05004-0012	22 -031			05007-0013	03 -004	P2FFC	
03805	07 -023	P2FFC		05004-0014	22 -046	P2FFC		05007-0016	07 -024	P2FFC	
03806	07 -027	P2FFC		05004-0014	29 -075			05007-0016	20 -034		
03810-0015	35 -031			05004-0015	08 -002	P2FFC		05007-0016	30 -020		
03866	25 -026			05004-0015	22 -061			05007-0016	32 -039		
03866	26 -009			05004-0017	19 -105			05007-0016	38 -002		
03919-0003	28 -009	A FFR		05004-0018	07 -020			05007-0017	03 -006	P2FFC	
03947-0002	28 -004	A FFR		05004-0018	20 -040			05007-0017	03 -008	P2FFC	
04145	24 -039			05004-0018	22 -059			05007-0017	10 -007		
04147	24 -036	P2FFC		05004-0018	24 -019	P2FFC		05007-0017	18 -006		
04149	02 -007	P2FFC		05004-0022	18 -017			05007-0017	23 -023		
04199	35 -011	P2FFC		05004-0022	18 -040			05007-0018	15 -002		
04205	32 -057			05004-0022	19 -018			05007-0024	01 -022		
04214	35 -017	M TTC		05004-0022	19 -028			05007-0024	03 -012		
04215	35 -016	M TTC		05004-0022	22 -007			05007-0024	03 -016	P2FFC	
04216	35 -021	P2FFC		05004-0022	29 -003			05007-0024	03 -025		
04224	35 -005	P2FFC		05004-0022	38 -014			05007-0024	03 -030		
04244	32 -038			05004-0022	03 -103			05007-0024	03 -077		
04260	10 -022	P1FFC		05004-0022	04 -008	P2FFC		05007-0024	03 -080		
04289	35 -014	P2FFC		05004-0022	10 -026			05007-0024	03 -083		
04294	18 -027	P2FFC		05004-0022	12 -015			05007-0024	03 -086		
04295	16 -044	P2FFC		05004-0023	24 -007			05007-0024	03 -108		
04297	18 -045	P2FFC		05004-0025	04 -001	P2FFC		05007-0024	03 -155		
04298	18 -047	P1FFC		05004-0025	15 -003			05007-0024	03 -174		
04505	35 -009	N FFC		05004-0025	19 -016			05007-0024	07 -002		
04512	04 -035			05004-0027	29 -064	P2FFC		05007-0024	07 -006		
04515	30 -025			05004-0029	13 -004	P2FFC		05007-0024	07 -007		
04525	30 -012	X1FFC		05004-0029	21 -002			05007-0074	07 -016		
04529	25 -004	P2FFC		05004-0029	21 -005			05007-0024	11 -006		
04530	25 -018	P2FFC		05004-0030	19 -007	P2FFC		05007-0024	11 -012		
04531	30 -007	P2FFC		05004-0031	29 -016	P2FFC		05007-0024	12 -022		
04532	18 -048	N FFC		05004-0033	18 -023	P2FFC		05007-0024	12 -024		
04533	39 -017			05004-0033	20 -016			05007-0024	30 -030		
04534	39 -018			05004-0033	23 -016			05007-0024	32 -052		
04535	39 -020			05004-0033	23 -028			05007-0024	35 -002		
04546	28 -016	P2FFC		05004-0033	24 -026			05007-0024	35 -032		
04547-0002	28 -015	P2FFC		05004-0036	30 -006			05007-0029	19 -069		
04554	39 -015			05004-0041	19 -060			05007-0030	17 -007	P2FFC	
04560	13 -003	P1FFC		05004-0041	19 -071			05007-0032	03 -087	P2FFC	
04563	02 -004			05004-0041	19 -078			05007-0033	10 -053	P1FFC	
04580	29 -072	N FFC		05004-0041	23 -002			05007-0033	18 -042		
04582	29 -078	P2FFC		05004-0041	23 -025			05007-0033	20 -003		
04606	03 -013			05004-0041	23 -032			05007-0033	23 -004		
04623	27 -009			05004-0041	23 -051			05007-0038	11 -003	P2FFC	

PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE	PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE	PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE
05007-0038	18 -031			05012-0048	14 -004	P2FFC		05032-0029	10 -018		
05007-0038	20 -010			05012-0070	10 -042	P2FFC		05032-0029	18 -021	P1FFC	
05007-0040	32 -010	P2FFC		05012-0070	19 -048			05037-0002	39 -024		
05007-0042	04 -031	P2FFC		05013-0001	25 -005	P2FFC		05037-0003	39 -025		
05007-0048	17 -008	P2FFC		05013-0001	26 -014			05041-0001	39 -028		
05007-0048	30 -023			05013-0002	26 -002	P2FFC		05045-0003	32 -054		
05007-0049	10 -008			05013-0003	27 -049	P1FFC		05047-0001	10 -001		
05007-0051	10 -010			05016-0002	23 -034			05048-0001	01 -006	P1FFC	
05007-0051	32 -030	P2FFC		05016-0003	23 -009	P1FFC		05068-0005	35 -034	P2FFC	
05007-0055	01 -008			05016-0016	03 -173			05070-0001	07 -013		
05007-0056	02 -017			05016-0018	06 -013	P2FFC		05070-0001	18 -026		
05007-0057	19 -064	P2FFC		05017-0004	06 -007	P2FFC		05070-0005	27 -048	P2FFC	
05007-0061	09 -011	P2FFC		05017-0004	06 -011			05072-0002	22 -050	P2FFC	
05007-0062	30 -027	P2FFC		05019-0006	02 -012			05072-0003	05 -008	N FFC	
05007-0068	19 -088	P2FFC		05019-0012	10 -015	P2FFC		05077-0022	14 -003		
05007-0068	32 -024			05020-0001	03 -002			05079-0001	05 -013	P2FFC	
05007-0075	09 -002	P2FFC		05020-0001	03 -172			05080-0006	15 -007	P2FFC	
05007-0079	03 -043	P2FFC		05020-0001	07 -014			05080-0020	14 -002	P2FFC	
05007-0080	01 -011	P2FFC		05028-0002	31 -003	N FFC		05082-0001	02 -006	P2FFC	
05007-0081	01 -015	P2FFC		05029-0001	37 -011			05090-0003	35 -025		
05007-0085	03 -050	P1FFC		05029-0002	39 -012			05098-0002	21 -017	P2FFC	
05007-0085	03 -054			05029-0005	39 -007			05099-0001	35 -026		
05007-0089	03 -072			05030-0001	18 -004	P2FFC		05140-0001	39 -039		
05007-0089	03 -094	P2FFC		05030-0002	06 -014			05144-0002	38 -006		
05007-0099	32 -049			05030-0002	19 -086			05152-0001	03 -021	P2FFC	
05007-0130	20 -030			05030-0002	21 -016			05178	39 -041		
05007-0133	35 -012	P2FFC		05030-0002	32 -026			05180-0001	12 -004		
05007-0140	10 -056	P2FFC		05030-0002	04 -006	P2FFC		05198-0001	19 -012	P2FFC	
05007-0151	35 -007			05030-0003	03 -027	P2FFC		05207	39 -026		
05007-0151	35 -035			05030-0003	13 -014			05209-0008	37 -003		
05007-0182	03 -165			05030-0003	21 -018			05209-0009	36 -004		
05007-0206	13 -018			05030-0003	32 -007			05226-0001	18 -013		
05007-0209	35 -027			05030-0006	03 -149	P2FFC		05227-0001	32 -061		
05007-0211	06 -002			05030-0006	28 -012			05511-0131	09 -019	P1FFC	
05008-0003	19 -042	P2FFC		05030-0006	35 -029			05511-0131	28 -005		
05008-0004	21 -020	P2FFC		05030-0007	19 -026	P1FFC		05511-0132	34 -006	P1FFC	
05008-0007	29 -031	P2FFC		05030-0007	25 -012			05511-0132	34 -015		
05008-0008	10 -051			05030-0007	29 -043			05511-0187	34 -004		
05008-0008	13 -009			05030-0007	29 -050			05513-0002	34 -013		
05008-0008	22 -056			05030-0007	29 -058			05516-0016	03 -024		
05008-0008	27 -058	P2FFC		05030-0007	29 -082			05516-0016	03 -041		
05008-0008	23 -011			05030-0007	29 -089			05516-0016	03 -166	N FFC	
05008-0008	27 -002			05030-0007	29 -095			05533-0005	33 -009		
05008-0009	22 -044			05030-0008	18 -033	P2FFC		05534-0008	35 -001	P1FFC	
05008-0010	20 -052			05030-0008	32 -036			05534-0019	32 -016	P2FFC	
05008-0013	13 -013	P2FFC		05030-0008	38 -017			05534-0021	32 -017		
05008-0013	29 -073	P2FFC		05030-0009	27 -024	P2FFC		05534-0023	34 -005	N FFC	
05008-0013	29 -076			05030-0010	10 -017			05534-0023	34 -014		
05008-0015	13 -005	P2FFC		05030-0010	11 -009			05539-0009	09 -021	P2FFC	
05008-0015	19 -081	P2FFC		05030-0010	11 -010			05539-0009	28 -007		
05008-0021	27 -010			05030-0010	24 -038			05544-0001	39 -035		
05008-0021	27 -015	P2FFC		05030-0010	24 -041			05551-0002	32 -033	M FFC	
05008-0021	29 -070			05030-0010	27 -045			05564-0019	36 -003		
05008-0022	27 -035			05030-0010	29 -077			05564-0020	37 -007		
05008-0026	23 -048	P2FFC		05030-0010	32 -053			05564-0021	35 -002		
05008-0028	30 -011			05030-0013	20 -028	N FFC		05572-0003-008	17 -007	P2FFC	
05008-0028	30 -017			05030-0013	26 -050			05577-0015	32 -021	P1FFC	
05008-0031	19 -020	P2FFC		05030-0015	35 -037	P1FFC		05577-0016	34 -002	P1FFC	
05008-0033	19 -041			05030-0027	18 -032	P2FFC		05577-0017	32 -020	P2FFC	
05008-0046	19 -025	P2FFC		05030-0028	38 -010			05577-0048	03 -023	P1FFC	
05008-0048	19 -032	P2FFC		05032-0003	01 -017			05581-0010	03 -020	P1FFC	
05008-0052	10 -038	P2FFC		05032-0003	23 -008			05586-0015	33 -010	P1FFC	
05008-0053	17 -010	P2FFC		05032-0004	06 -004	P1FFC		05611-0008	31 -006	P1FFC	
05008-0053	19 -102			05032-0004	32 -031			05611-0008	32 -018		
05008-0054	17 -013	P2FFC		05032-0004	32 -051			05618-1080	32 -023	P1FFC	
05008-0054	17 -016	P2FFC		05032-0005	11 -007			07140	39 -000		
05008-0054	19 -093			05032-0005	11 -013			C8141	39 -008		
05008-0063	27 -018			05032-0005	12 -023			1-45 DEG BEND	34 -029		
05008-0063	27 -028			05032-0005	18 -043			1/8X2-1/4	39 -010		
05009-0001	15 -018			05032-0005	20 -032			1N2986B	33 -001		
05009-0001	19 -035	P2FFC		05032-0005	29 -071			10125	15 -008		
05009-0001	22 -002			05032-0006	10 -011			1104-00	37 -011	P2FFC	
05009-0001	22 -040			05032-0006	29 -074			1202-00	10 -034	P1FFC	
05009-0001	25 -015			05032-0007	03 -040	P1FFC		1202-00	13 -085		
05009-0001	29 -008			05032-0007	03 -062			1203-00	10 -034	P2FFC	
05009-0005	16 -006	P2FFC		05032-0007	12 -025			04-03	20 -035	P1FFC	
05009-0006	07 -022	P2FFC		05032-0007	13 -006			2N1771A	33 -003		
05009-0006	07 -018			05032-0007	13 -011			2N930	33 -008		
05009-0012	24 -008	P2FFC		05032-0007	13 -020			201	29 -018	P1FFC	
05009-0012	27 -044			05032-0009	01 -013	N FFC		22200-0001	02 -015	N FFC	
05009-0031	25 -013	P2FFC		05032-0010	22 -051	P1FFC		22201	02 -013	N FFR	
05009-0053	11 -008			05032-0012	16 -005	P1FFC		22214-0001	02 -011	A FFC	
05012-0001	05 -004	P2FFC		05032-0013	30 -028			26786	09 -005	P2FFC	
05012-0001	29 -020			05032-0014	19 -090			29138	18 -027		
05012-0002	27 -057	P1FFC		05032-0014	27 -036			29141	18 -025	P2FFC	
05012-0004	15 -005			05032-0015	21 -014	P1FFC		29144	18 -028	P2FFC	
05012-0014	04 -028	P2FFC		05032-0016	15 -004	P1FFC		29145	25 -006	A FFR	
05012-0015	05 -006	P2FFC		05032-0016	18 -018			3-316	39 -014		
05012-0028	09 -015	P1FFC		05032-0020	06 -008	P2FFC		30017	18 -005	P2FFC	
05012-0029	05 -001	P2FFC		05032-0028	35 -030			30018	18 -008	P1FFC	

PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE	PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE	PART NUMBER	FIGURE & INDEX NO.	SOURCE CODE	RECOVER CODE
30048	03 -169	X1FFC		33621	20 -007	P1FFC		37506	20 -046		
30050	03 -168			33696	03 -167	N FFC		37507	24 -021		
30080	28 -018	P2FFC		33810	10 -021	N FFC		37509	18 -022		
30081	28 -017	P2FFC		33813	10 -016			37509	23 -015		
30182	27 -040	P2FFC		33854	03 -032	A FFR		37509	23 -027		
30183	27 -041	P1FFC		33855	03 -033	A FFR		37509	24 -009		
30259	03 -161	P2FFR		33857	07 -028	A FFR		37509	24 -020		
30261	27 -030	P2FFC		33863	10 -055	P2FFC		37509	24 -025		
30262	27 -021	P2FFC		33864	10 -057	P2FFC		37510	23 -019	N FFC	
30272	31 -007	N FFC		34250	29 -033	P2FFC		37511	24 -031	N FFC	
30273	31 -001	N FFC		34258-0002	01 -014	A FFR		37512	24 -017	N FFC	
30274	31 -002	N FFC		34258-0002	09 -000			37516	20 -054	N FFC	
30286	03 -045	P2FFC		34289	03 -104	N FFC		37524	20 -020	N FFC	
30294	24 -045	P2FFC		34290	03 -170	A FFR		37525	20 -042	N FFC	
30305	24 -044	P1FFC		34304	39 -040			37528	10 -012		
30329	15 -013	P2FFC		34932	39 -022			37531	38 -009		
30361	24 -042	P2FFC		34933	39 -023			37567	19 -056	P2FFC	
30363	15 -015	P2FFC		36086	27 -019			37578	23 -021		
30388-0001	15 -024	N FFC		36334	18 -030	A FFR		37594	12 -005		
30389	15 -012	N FFC		36335	18 -038	N FFC		37594	12 -019	P2FFC	
30394	29 -068	P2FFC		36336	18 -037	P2FFC		37726	19 -011	P2FFC	
30400	10 -050			36337	18 -036	P2FFC		37727	19 -091	X1FFC	
30400-0001	15 -000	A FFR		36344	18 -035	P2FFC		37728	19 -080	P2FFC	
30456	27 -026			36345	18 -034			37729	15 -020	P2FFC	
30458	27 -017	P2FFC		36360	32 -022			37735	10 -059		
30470-0007	01 -019	N FFC		36373	19 -044	P2FFC		37735	17 -000	A FFR	
30470-0007	31 -000			36481	32 -034			37736-0001	10 -062	A FFR	
30472	18 -041	A FFR		36573	13 -022			37736-0001	27 -000		
30493	35 -022	N FFC		36579	13 -017			37736-0002	10 -062	A FFR	
30498	35 -004			36581	13 -024	P2FFC		37736-0002	27 -000		
30502	03 -059	P2FFC		36592	13 -015	P2FFC		37736-0003	10 -062	A FFR	
30504	04 -004	P1FFC		36594	10 -006			37736-0003	27 -000		
30506	03 -053	P2FFC		36594	12 -000	A FFR		37738	01 -021		
30507	03 -057	P1FFC		36598	12 -021	P2FFC		37739	01 -021	A FFR	
30508	03 -099	P1FFC		36601	12 -014			37740-0002	01 -023		
30509	03 -067	P2FFC		36602	12 -030			37741-0003	01 -004	A FFR	
30513	03 -069	P1FFC		36603	12 -007	P2FFC		37741-0003	02 -000	A FFR	
30514	03 -097	P2FFC		36604	12 -008	P2FFC		37741-0004	01 -004		
30515	03 -075	P2FFC		36606	12 -011	P2FFC		37741-0004	02 -000		
30516	03 -098	P2FFC		36610	12 -028	P2FFC		37742-0002	01 -029	A FFR	
30517	04 -003	A FFR		36612	12 -027	P2FFC		37742-0002	32 -000		
30519	03 -096	X1FFC		36615	12 -017	P2FFC		37743-0002	01 -020	A FFR	
30577	21 -019	P2FFC		36616	12 -020	P2FFC		37743-0002	32 -000		
30590	06 -010	P1FFC		36665	12 -013	P2FFC		37744-0001	01 -018	A FFR	
30592	06 -006	P1FFC		36667	12 -026			37744-0001	10 -000		
30593	06 -001	N FFC		36672	35 -033	N FFC		37744-0002	01 -018	A FFR	
30594	06 -005	P1FFC		36744	34 -016	P1FFC		37744-0002	10 -000		
30595	06 -009	P2FFC		37141	28 -008			37744-0003	01 -018	A FFR	
30611	05 -007	P2FFC		37142	33 -011			37744-0003	10 -000		
30612	03 -048	A FFR		37143	33 -013			37756	24 -013		
30612	04 -000			37144	33 -012			37757	24 -012		
30613	06 -016	P1FFC		37147-0002	32 -064			37759	24 -010	N FFC	
30614	03 -074	N FFC		37148	32 -062	P2FFR		37775	15 -009	P2FFC	
30615	03 -105	A FFC		37148	33 -000			37797	15 -011	P2FFC	
30615	06 -000			37164	32 -044			37798	20 -027	P2FFC	
30617	03 -044	A FFR		37165	32 -043			37799	20 -049		
30617	05 -000			37184	38 -019			37800	24 -014		
30620	03 -093	P2FFC		37185	38 -016			37800	24 -028	N FFC	
30623-0002	03 -175	A FFR		37186	38 -013			37801	20 -048	P2FFC	
30623-0002	07 -000			37192	38 -004			37802	20 -026		
30624	07 -013	N FFC		37193	38 -005			37803	20 -029		
30660	22 -057	P2FFC		37194	38 -007			37831	10 -030	P2FFC	
30661	22 -055	P2FFC		37195	38 -008			37834	12 -016	P2FFC	
30671	03 -082	P2FFC		37196	38 -001			37836	19 -004		
30673	21 -013	P2FFC		37197	38 -020			37911	17 -017	X1FFC	
30675	21 -008	P1FFC		37198	38 -015			37934	29 -054	P2FFC	
30677	21 -011	P2FFC		37200	38 -000			37945	20 -017	N FFC	
30686	27 -027			37253	39 -034			37948	01 -005	A FFR	
30783	06 -015	N FFC		37432	10 -048			37948	03 -000		
30784	06 -012	N FFC		37433	27 -014	P2FFC		37964	12 -009		
30821	03 -071	N FFC		37440-0002	35 -000			37967	32 -029		
30897	04 -007	P1FFC		37453	19 -087			37968	32 -027		
30898	01 -003	N FFC		37455	19 -084			37983	35 -006	P2FFC	
30899	02 -018	N FFC		37456	19 -013	P2FFC		37988	17 -004		
33	39 -021			37457	19 -082	P2FFC		37990	10 -027		
33024-0003	27 -005	A FFR		37458	19 -083			37993	11 -014	N FFC	
33024-0003	28 -000			37482	24 -022	N FFC		38000	13 -008	N FFC	
33025-0002	09 -001	N FFC		37495	20 -060	N FFC		38004	20 -038	P2FFC	
33032	10 -061			37497-0001	02 -022	A FFR		38004	23 -042		
33032	26 -000	A FFR		37497-0002	02 -022			38005	18 -039		
33131-0002	10 -060			37498	35 -038			38005	19 -059		
33131-0002	25 -000			37499-0001	32 -048			38005	19 -077		
33131-0003	10 -060			37499-0001	34 -000			38005	23 -001		
33131-0003,	25 -000	A FFR		37499-0002	32 -048			38005	23 -024		
33225	22 -030	P2FFC		37499-0002	34 -000			38005	23 -031		
33372	21 -006	P2FFC		37500	01 -000	A FFR		38005	23 -050		
33379	22 -036	P2FFC		37501	01 -000	A FFR		38008-0001	03 -014	X1FFC	
33381	22 -032	P2FFC		37502	01 -000	A FFR		38009	10 -041	P2FFC	
33384	20 -009	A FFR		37506	20 -024	P2FFC		38010	10 -040	P2FFC	
33384	22 -000			37506	20 -044			38011	10 -047	N FFC	

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38013	10 -031	P2FFC	
38014	14 -001	P2FFC	
38019	14 -007	X1FFC	
38024	18 -049	N FFC	
38027	10 -043	N FFC	
38030	12 -029	N FFC	
38032	35 -018		
38035	21 -004	P2FFC	
38037	21 -009	P2FFC	
38039	21 -021	P2FFC	
38065	20 -002	A FFR	
38065	21 -000		
38073	14 -006		
38074	14 -006	X1FFC	
38084	12 -003	P2FFC	
38085	12 -002	P2FFC	
38086	35 -010		
38093	10 -044	A FFR	
38094-0001	10 -049		
38094-0001	14 -000	A FFR	
38094-0002	10 -049		
38094-0002	14 -000		
38095-0001	14 -005	P2FFC	
38095-0002	14 -005	P2FFC	
38096	13 -023	N FFC	
38097	17 -015	P2FFC	
38098	17 -023	A FFR	
38098	19 -000		
38099	19 -111	A FFR	
38099	20 -000		
38100	20 -061	A FFR	
38100	23 -000		
38100	24 -000		
38101	19 -098	P2FFC	
38102	19 -076	A FFR	
38103	19 -058	A FFR	
38104	20 -011	A FFR	
38105	20 -036	A FFR	
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38107	23 -026	P2FFC	
38108	23 -037	A FFR	
38109	24 -030	A FFR	
38110	24 -016	A FFR	
38111	23 -052		
38111	24 -046	N FFC	
38112	10 -023	P2FFC	
38113-0001	27 -064	A FFR	
38113-0002	27 -064	A FFR	
38113-0002	29 -000		
38113-0003	27 -064	A FFR	
38113-0003	29 -000		
38114-0001	29 -098	A FFR	
38114-0001	30 -000		
38114-0002	29 -098	A FFR	
38114-0002	30 -000		
38114-0003	29 -098	A FFR	
38114-0003	30 -000		
38133-0001	29 -000		
38141	10 -009		
38143-0001	02 -019	A FFR	
38143-0002	02 -019	A FFR	
38144	03 -003	N FFC	
38145	03 -007	N FFC	
38146	03 -171	N FFC	
38147	10 -028		
38147	13 -000	A FFR	
38148	13 -016	P2FFC	
38162	11 -005	P2FFC	
38163	11 -011	P2FFC	
38164	10 -004		
38164	11 -000	A FFR	
38204-0001	30 -031	N FFC	
38204-0002	30 -031	N FFC	
38204-0003	30 -031	N FFC	
38232	35 -023	P2FFC	
38233	35 -020	P2FFC	
38234	35 -019	P2FFC	
38235	35 -024	P2FFC	
38237	32 -059	N FFC	
38241	19 -045	A FFR	
38242	18 -001	A FFR	
38243	17 -006	A FFR	
38243	18 -000		
38244	19 -057	N FFC	
38246	19 -055	N FFC	
38248	18 -011	N FFC	
38249	18 -015	N FFC	
38261	16 -003	P2FFC	
38262	10 -052		
38262	16 -000		
38263	01 -021		
38267	34 -008		
38268	34 -018	N FFC	
38289	32 -060	P2FFC	
38301	19 -110	X1FFC	
38302	34 -001	A FTR	
38303	34 -011	A FFR	
38305	29 -062	P2FFC	
38306	20 -022	P2FFC	
38310	17 -011	X1FFC	
38311	17 -009	P2FFC	
38375	33 -014		
38385	32 -037	N FFC	
38390	32 -058	N FFC	
38391	32 -041	N FFC	
38399	30 -005		
38400	30 -003	N FFC	
38403	32 -042	N FFC	
38404	34 -010	N FFC	
38405	34 -001	A FFR	
38406	19 -040	N FFC	
38434	10 -020	P2FFC	
38440	15 -016	P2FFC	
38441	15 -023	P2FFC	
38442	15 -021	N FFC	
38443	15 -022	N FFC	
38463	15 -017	N FFC	
38464	15 -019	N FFC	
38473	32 -014	N FFC	
38474-0001	01 -007		
38474-0002	01 -007		
38474-0003	01 -007		
38475-0001	32 -063		
38475-0002	32 -063		
38476-0001	02 -016		
38476-0002	02 -016		
38479	32 -015		
38557	37 -000		
38558	36 -000		
38641	03 -019		
38642	03 -015	A FFR	
38646	10 -003		
38649	10 -002		
38767	09 -017	P2FFC	
38844	19 -047		
38846	19 -049		
38847	12 -006	P2FFC	
38849	10 -013		
38853	20 -021	P2FFC	
38854	20 -043	P2FFC	
38864	27 -038		
39025	27 -046	P2FFC	
39026	27 -043	P2FFC	
39027	27 -034		
4035	39 -037		
419	37 -004		
42W	32 -019	P1FFC	
50 FA 440	03 -063	P2FFC	
50 FA 440	13 -021		
50 FA 440	29 -075		
50 FA 440	32 -032		
50 FK 632	23 -014	P2FFC	
5100-25	27 -056	P2FFC	
5100-34	23 -039	P2FFC	
5100-34	29 -037		
5100-34	29 -044		
5100-34	29 -051		
5100-34	29 -059		
5100-34	29 -083		
5100-34	29 -090		
5103-12	23 -036	P2FFC	
5103-18	25 -009	P2FFC	
5103-50	25 -025	P2FFC	
5133-12	12 -010	P2FFC	
5133-12	12 -018		
5133-12	15 -010		
5133-12	18 -020		
5133-12	20 -012		
5133-12	20 -023		
5133-12	20 -025		
5133-12	20 -037		
5133-12	20 -045		
5133-12	20 -047		
5133-12	27 -033		
5133-16	15 -014	P2FFC	
5133-31	17 -019	P2FFC	
5133-31	17 -020	P2FFC	
5133-9	03 -068	P2FFC	
5133-9	10 -029		
5133-9	12 -012		
5133-9	16 -002		
5133-9	18 -046		
5133-9	19 -002		
5133-9	23 -046		
5133-9	24 -043		
5133-9	30 -009		
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5139-12	18 -002	P2FFC	
5139-12	19 -046		
5139-18	16 -004	P2FFC	
5144-22	10 -058		
520-45 DEG BEN	39 -032		
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SECTION III

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1AMPAN935-4L	38 -003	AN935-4L
1AMPAN935-5L	01 -016	AN935-5L
1AMPPL-331	39 -038	PL-331
1AMPTYPE C	39 -019	TYPE C
1AMP0.035X1-1/4	39 -009	0.035X1-1/4
1AMP01175	09 -014	01175
1AMP012	39 -031	012
1AMP018	39 -030	018
1AMP01884-0002	08 -006	01884-0002
1AMP01885	08 -004	01885
1AMP01965-0002	01 -010	01965-0002
1AMP01965-0002	08 -000	01965-0002
1AMP01969	08 -001	01969
1AMP02225	31 -004	02225
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1AMP02533	09 -006	02533
1AMP02538-0003	09 -007	02538-0003
1AMP02673	39 -016	02673
1AMP02843	09 -020	02843
1AMP03013	38 -012	03013
1AMP03056-0002	09 -004	03056-0002
1AMP03356-0001	02 -001	03356-0001
1AMP03357	02 -021	03357
1AMP03359	02 -002	03359
1AMP03369	02 -003	03369
1AMP03387	02 -005	03387
1AMP03395	02 -020	03395
1AMP03399	02 -014	03399
1AMP03417	09 -003	03417
1AMP03423	09 -022	03423
1AMP03625-0001	02 -008	03625-0001
1AMP03628	02 -007	03628
1AMP03629	02 -010	03629
1AMP03755	09 -008	03755
1AMP04149	02 -007	04149
1AMP04533	39 -017	04533
1AMP04534	39 -018	04534
1AMP04535	39 -020	04535
1AMP04554	39 -015	04554
1AMP04563	02 -004	04563
1AMP04723	09 -010	04723
1AMP04811-0002	08 -003	04811-0002
1AMP05004-0012	22 -015	05004-0012
1AMP05004-0015	08 -002	05004-0015
1AMP05004-0022	38 -014	05004-0022
1AMP05006-0006	01 -012	05006-0006
1AMP05006-0006	09 -009	05006-0006
1AMP05006-0006	38 -018	05006-0006
1AMP05006-0023	38 -011	05006-0023
1AMP05007-0009	08 -005	05007-0009
1AMP05007-0016	38 -002	05007-0016
1AMP05007-0024	01 -022	05007-0024
1AMP05007-0055	01 -008	05007-0055
1AMP05007-0056	02 -017	05007-0056
1AMP05007-0061	09 -011	05007-0061
1AMP05007-0075	09 -002	05007-0075
1AMP05007-0080	01 -011	05007-0080
1AMP05007-0081	01 -015	05007-0081
1AMP05007-0140	10 -056	05007-0140
1AMP05012-0028	09 -015	05012-0028
1AMP05016-0016	03 -173	05016-0016
1AMP05017-0004	06 -011	05017-0004
1AMP05019-0006	02 -012	05019-0006
1AMP05028-0002	31 -003	05028-0002
1AMP05029-0001	39 -011	05029-0001
1AMP05029-0002	39 -012	05029-0002
1AMP05029-0005	39 -007	05029-0005
1AMP05030-0008	38 -017	05030-0008
1AMP05030-0028	38 -010	05030-0028
1AMP05032-0003	01 -017	05032-0003
1AMP05032-0009	01 -013	05032-0009
1AMP05037-0002	39 -024	05037-0002
1AMP05037-0003	39 -025	05037-0003
1AMP05041-0001	39 -028	05041-0001
1AMP05048-0001	01 -006	05048-0001
1AMP05070-0001	09 -013	05070-0001
1AMP05082-0001	02 -006	05082-0001
1AMP05140-0001	39 -039	05140-0001
1AMP05144-0002	38 -006	05144-0002
1AMP05178	39 -041	05178
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1AMP05209-0009	36 -004	05209-0009
1AMP05511-0131	09 -019	05511-0131
1AMP05539-0009	09 -021	05539-0009
1AMP05544-0001	39 -035	05544-0001
1AMP05564-0019	36 -003	05564-0019
1AMP05564-0020	37 -002	05564-0020
1AMP05564-0021	36 -002	05564-0021
1AMP07140	39 -000	07140
1AMP08141	39 -008	08141
1AMP1-45 DEG	39 -029	1-45 DEG
1AMP1/8X2-1/4	39 -010	1/8X2-1/4
1AMP22200-0001	02 -015	22200-0001
1AMP22201	02 -013	22201
1AMP22214-0001	02 -011	22214-0001
1AMP26786	09 -005	26786
1AMP3-316	39 -014	3-316
1AMP30272	31 -007	30272
1AMP30273	31 -001	30273
1AMP30274	31 -002	30274
1AMP30470-0007	01 -019	30470-0007
1AMP30470-0007	31 -000	30470-0007
1AMP30898	01 -003	30898
1AMP30899	02 -018	30899
1AMP33	39 -021	33
1AMP33025-0002	09 -001	33025-0002
1AMP34258-0002	01 -014	34258-0002
1AMP34258-0002	09 -000	34258-0002
1AMP34304	39 -040	34304
1AMP34932	39 -022	34932
1AMP34933	39 -023	34933
1AMP37184	38 -019	37184
1AMP37185	38 -016	37185
1AMP37186	38 -013	37186
1AMP37192	38 -004	37192
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1AMP37196	38 -001	37196
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1AMP37198	38 -015	37198
1AMP37200	38 -000	37200
1AMP37253	39 -034	37253
1AMP37497-0001	02 -022	37497-0001
1AMP37497-0002	02 -022	37497-0002
1AMP37500	01 -000	37500
1AMP37501	01 -000	37501
1AMP37502	01 -000	37502
1AMP37531	38 -009	37531
1AMP37739	01 -021	37739
1AMP37741-0003	02 -000	37741-0003
1AMP37741-0003	01 -004	37741-0003
1AMP37741-0004	02 -000	37741-0004
1AMP37741-0004	01 -004	37741-0004
1AMP38143-0001	02 -019	38143-0001
1AMP38143-0002	02 -019	38143-0002
1AMP38263	01 -021	38263
1AMP38474-0001	01 -007	38474-0001
1AMP38474-0002	01 -007	38474-0002
1AMP38474-0003	01 -007	38474-0003
1AMP38476-0001	02 -016	38476-0001
1AMP38476-0002	02 -016	38476-0002
1AMP38557	37 -000	38557
1AMP38558	36 -000	38558
1AMP38767	09 -017	38767
1AMP4035	39 -037	4035
1AMP419	37 -004	419
1AMP5103-12	23 -036	5103-12
1AMP520-45 DEG	39 -032	520-45 DEG
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1AMP607-7/64	39 -004	607-7/64
1AMP776	39 -036	776
1AMP90-1/2	39 -027	90-1/2
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1AP1	36 -001	MS3116F12-10S
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1A1E8	32 -038	04244
1A1F5	31 -006	05611-0008
1A1J1	34 -003	MS3112E12-10P
1A1J10	34 -013	05513-0002
1A1J11	34 -006	05511-0132
1A1J2	34 -012	MS3112E14-5P
1A1J9	34 -004	05511-0187
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1A1MP03614	32 -002	03614
1A1MP04205	32 -057	04205
1A1MP04852	32 -003	04852
1A1MP05006-0009	32 -006	05006-0009
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1A1MP05006-0009	32 -055	05006-0009
1A1MP05007-0002	32 -056	05007-0002
1A1MP05007-0016	32 -039	05007-0016
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1A1MP05534-0021	32 -017	05534-0021
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1A1MP37147-0002	32 -064	37147-0002
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1A1MP37165	32 -043	37165
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1A1MP38303	34 -011	38303
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1A1MP38390	32 -058	38390
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1A1MP38404	34 -010	38404
1A1MP38405	34 -001	38405
1A1MP38473	32 -014	38473
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1A2MPAN935-10L	18 -003	AN935-10L
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1A2MPAN935-2L	27 -042	AN935-2L
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1A2MPRR-50	27 -059	RR-50
1A2MPRS-62	27 -052	RS-62
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1A2MP00221	22 -039	00221
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1A2MP01213	25 -022	01213
1A2MP01214	25 -023	01214
1A2MP01215	25 -024	01215
1A2MP01216	26 -004	01216
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1A2MP01219	26 -007	01219
1A2MP01221	25 -030	01221
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1A2MP01235	25 -029	01235
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1A2MP01237	26 -013	01237
1A2MP01246	23 -005	01246
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1A2MP01253	13 -012	01253
1A2MP01254	29 -021	01254
1A2MP01255	15 -001	01255
1A2MP01261	10 -045	01261
1A2MP01262	13 -001	01262
1A2MP01265	29 -013	01265
1A2MP01266	29 -027	01266
1A2MP01268	29 -024	01268
1A2MP01269	29 -017	01269
1A2MP01270	26 -015	01270
1A2MP01278-0001	27 -055	01278-0001
1A2MP01280-0001	27 -047	01280-0001
1A2MP01281	27 -058	01281
1A2MP01284-0004	19 -104	01284-0004
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1A2MP01332	18 -012	01332
1A2MP01347	26 -001	01347
1A2MP01349	29 -026	01349
1A2MP01362	23 -049	01362
1A2MP01362	30 -018	01362
1A2MP01363	23 -047	01363
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1A2MP01663	17 -012	01663
1A2MP01664	19 -092	01664
1A2MP01666	22 -013	01666
1A2MP01668	22 -048	01668
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1A2MP01685	22 -063	01685
1A2MP01686	22 -054	01686
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1A2MP01698	22 -005	01698
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1A2MP01756	18 -019	01756
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1A2MP01852	29 -029	01852
1A2MP01854	24 -002	01854
1A2MP01856	24 -001	01856
1A2MP01866	23 -007	01866
1A2MP01887	23 -010	01887
1A2MP01916	23 -013	01916
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1A2MP02015	19 -096	02015
1A2MP02018	22 -014	02018
1A2MP02019	22 -024	02019
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1A2MP02021	22 -020	02021
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1A2MP02030	22 -052	02030
1A2MP02073-0003	19 -095	02073-0003
1A2MP02086	27 -031	02086
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1A2MP02093	30 -001	02093
1A2MP02095	23 -045	02095
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1A2MP02095	30 -014	02095
1A2MP02105	19 -022	02105
1A2MP02106	18 -014	02106
1A2MP02106	19 -021	02106
1A2MP02136	22 -053	02136
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1A2MP02374	29 -039	02374
1A2MP02379	19 -015	02379
1A2MP02381	19 -008	02381
1A2MP02385	19 -107	02385
1A2MP02408	19 -003	02408
1A2MP02439	24 -004	02439
1A2MP02507	22 -043	02507
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1A2MP02509-0001	23 -044	02509-0001
1A2MP02509-0001	30 -013	02509-0001
1A2MP02510-0001	30 -022	02510-0001
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1A2MP02530	27 -062	02530
1A2MP02531	27 -063	02531
1A2MP02542	27 -022	02542
1A2MP02546	28 -013	02546
1A2MP02547	28 -014	02547
1A2MP02559	19 -065	02559
1A2MP02572	29 -053	02572
1A2MP02575	29 -047	02575
1A2MP02589	29 -061	02589
1A2MP02590	29 -055	02590
1A2MP02591	29 -086	02591
1A2MP02592	29 -092	02592
1A2MP02599	29 -079	02599
1A2MP02600	29 -085	02600
1A2MP02602	29 -040	02602
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1A2MP02612	29 -030	02612
1A2MP02622	17 -001	02622
1A2MP02623	17 -005	02623
1A2MP02624	17 -003	02624
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1A2MP03667	19 -009	03667
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1A2MP05004-0041	19 -078	05004-0041
1A2MP05004-0041	23 -002	05004-0041
1A2MP05004-0041	23 -025	05004-0041
1A2MP05004-0041	23 -032	05004-0041
1A2MP05004-0041	23 -051	05004-0041
1A2MP05004-0042	24 -018	05004-0042
1A2MP05004-0042	24 -032	05004-0042
1A2MP05004-0043	24 -003	05004-0043
1A2MP05004-0045	21 -007	05004-0045
1A2MP05004-0045	21 -010	05004-0045
1A2MP05004-0045	21 -012	05004-0045
1A2MP05006-0004	23 -020	05006-0004
1A2MP05006-0009	10 -019	05006-0009
1A2MP05006-0009	11 -004	05006-0009
1A2MP05006-0009	19 -053	05006-0009
1A2MP05006-0009	30 -021	05006-0009
1A2MP05006-0016	30 -024	05006-0016
1A2MP05006-0020	28 -003	05006-0020
1A2MP05006-0024	24 -037	05006-0024
1A2MP05006-0024	24 -040	05006-0024
1A2MP05006-0024	27 -003	05006-0024
1A2MP05007-0002	10 -033	05007-0002
1A2MP05007-0002	20 -055	05007-0002
1A2MP05007-0002	29 -014	05007-0002
1A2MP05007-0003	28 -002	05007-0003
1A2MP05007-0005	10 -005	05007-0005
1A2MP05007-0016	20 -034	05007-0016
1A2MP05007-0016	30 -020	05007-0016
1A2MP05007-0017	10 -007	05007-0017
1A2MP05007-0017	23 -023	05007-0017
1A2MP05007-0018	15 -002	05007-0018
1A2MP05007-0024	03 -077	05007-0024
1A2MP05007-0024	11 -006	05007-0024
1A2MP05007-0024	11 -012	05007-0024
1A2MP05007-0024	12 -022	05007-0024
1A2MP05007-0024	12 -024	05007-0024
1A2MP05007-0024	30 -030	05007-0024
1A2MP05007-0029	19 -069	05007-0029
1A2MP05007-0030	17 -007	05007-0030
1A2MP05007-0033	10 -053	05007-0033
1A2MP05007-0033	18 -042	05007-0033
1A2MP05007-0033	20 -003	05007-0033
1A2MP05007-0033	23 -004	05007-0033
1A2MP05007-0038	11 -003	05007-0038
1A2MP05007-0038	18 -031	05007-0038
1A2MP05007-0038	20 -010	05007-0038
1A2MP05007-0048	17 -008	05007-0048
1A2MP05007-0048	30 -023	05007-0048
1A2MP05007-0049	10 -008	05007-0049
1A2MP05007-0051	10 -010	05007-0051
1A2MP05007-0062	30 -027	05007-0062
1A2MP05007-0068	19 -088	05007-0068
1A2MP05007-0068	32 -024	05007-0068
1A2MP05007-0130	20 -030	05007-0130
1A2MP05007-0206	13 -018	05007-0206
1A2MP05008-0003	19 -042	05008-0003
1A2MP05008-0004	21 -020	05008-0004
1A2MP05008-0007	29 -031	05008-0007
1A2MP05008-0008	10 -051	05008-0008
1A2MP05008-0008	13 -009	05008-0008
1A2MP05008-0008	22 -056	05008-0008
1A2MP05008-0008	22 -058	05008-0008
1A2MP05008-0008	23 -011	05008-0008
1A2MP05008-0008	27 -002	05008-0008
1A2MP05008-0009	22 -044	05008-0009
1A2MP05008-0010	20 -052	05008-0010
1A2MP05008-0013	13 -013	05008-0013
1A2MP05008-0013	29 -073	05008-0013
1A2MP05008-0013	29 -076	05008-0013
1A2MP05008-0015	13 -005	05008-0015
1A2MP05008-0015	19 -081	05008-0015
1A2MP05008-0021	27 -010	05008-0021
1A2MP05008-0021	27 -015	05008-0021
1A2MP05008-0021	29 -070	05008-0021
1A2MP05008-0022	27 -035	05008-0022
1A2MP05008-0028	23 -048	05008-0028
1A2MP05008-0028	30 -011	05008-0028
1A2MP05008-0028	30 -017	05008-0028
1A2MP05008-0031	19 -020	05008-0031
1A2MP05008-0033	19 -041	05008-0033
1A2MP05008-0046	19 -025	05008-0046
1A2MP05008-0048	19 -032	05008-0048
1A2MP05008-0052	10 -038	05008-0052
1A2MP05008-0053	17 -010	05008-0053
1A2MP05008-0053	19 -102	05008-0053
1A2MP05008-0054	17 -013	05008-0054
1A2MP05008-0054	17 -016	05008-0054
1A2MP05008-0054	19 -093	05008-0054
1A2MP05008-0063	27 -018	05008-0063
1A2MP05008-0063	27 -028	05008-0063
1A2MP05009-0001	15 -018	05009-0001
1A2MP05009-0001	19 -035	05009-0001
1A2MP05009-0001	22 -002	05009-0001
1A2MP05009-0001	22 -040	05009-0001
1A2MP05009-0001	25 -015	05009-0001
1A2MP05009-0001	29 -008	05009-0001
1A2MP05009-0005	16 -006	05009-0005
1A2MP05009-0006	09 -018	05009-0006
1A2MP05009-0012	24 -008	05009-0012
1A2MP05009-0012	27 -044	05009-0012
1A2MP05009-0031	25 -013	05009-0031
1A2MP05009-0053	11 -008	05009-0053
1A2MP05012-0001	29 -020	05012-0001
1A2MP05012-0002	27 -057	05012-0002
1A2MP05012-0004	15 -005	05012-0004
1A2MP05012-0048	14 -004	05012-0048
1A2MP05012-0070	10 -042	05012-0070
1A2MP05012-0070	19 -048	05012-0070
1A2MP05013-0001	25 -005	05013-0001
1A2MP05013-0001	26 -014	05013-0001
1A2MP05013-0002	26 -002	05013-0002
1A2MP05013-0003	27 -049	05013-0003
1A2MP05016-0002	23 -034	05016-0002
1A2MP05016-0003	23 -009	05016-0003
1A2MP05019-0012	10 -015	05019-0012

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1A2MP05030-0001	18 -004	05030-0001
1A2MP05030-0002	19 -086	05030-0002
1A2MP05030-0002	21 -016	05030-0002
1A2MP05030-0003	13 -014	05030-0003
1A2MP05030-0003	21 -018	05030-0003
1A2MP05030-0006	28 -012	05030-0006
1A2MP05030-0007	19 -026	05030-0007
1A2MP05030-0007	25 -012	05030-0007
1A2MP05030-0007	29 -043	05030-0007
1A2MP05030-0007	29 -050	05030-0007
1A2MP05030-0007	29 -058	05030-0007
1A2MP05030-0007	29 -082	05030-0007
1A2MP05030-0007	29 -089	05030-0007
1A2MP05030-0007	29 -095	05030-0007
1A2MP05030-0008	18 -033	05030-0008
1A2MP05030-0009	27 -024	05030-0009
1A2MP05030-0010	10 -017	05030-0010
1A2MP05030-0010	11 -010	05030-0010
1A2MP05030-0010	24 -038	05030-0010
1A2MP05030-0010	24 -041	05030-0010
1A2MP05030-0010	27 -045	05030-0010
1A2MP05030-0010	29 -077	05030-0010
1A2MP05030-0013	20 -028	05030-0013
1A2MP05030-0013	20 -050	05030-0013
1A2MP05030-0027	18 -032	05030-0027
1A2MP05032-0003	23 -008	05032-0003
1A2MP05032-0005	11 -007	05032-0005
1A2MP05032-0005	11 -013	05032-0005
1A2MP05032-0005	12 -023	05032-0005
1A2MP05032-0005	18 -043	05032-0005
1A2MP05032-0005	20 -032	05032-0005
1A2MP05032-0005	29 -071	05032-0005
1A2MP05032-0006	10 -011	05032-0006
1A2MP05032-0006	29 -074	05032-0006
1A2MP05032-0007	12 -025	05032-0007
1A2MP05032-0007	13 -006	05032-0007
1A2MP05032-0007	13 -011	05032-0007
1A2MP05032-0007	13 -020	05032-0007
1A2MP05032-0010	22 -051	05032-0010
1A2MP05032-0012	16 -005	05032-0012
1A2MP05032-0013	30 -028	05032-0013
1A2MP05032-0014	19 -090	05032-0014
1A2MP05032-0014	27 -036	05032-0014
1A2MP05032-0015	21 -014	05032-0015
1A2MP05032-0016	15 -004	05032-0016
1A2MP05032-0016	18 -018	05032-0016
1A2MP05032-0029	10 -018	05032-0029
1A2MP05032-0029	18 -021	05032-0029
1A2MP05047-0001	10 -001	05047-0001
1A2MP05070-0001	18 -026	05070-0001
1A2MP05070-0005	27 -048	05070-0005
1A2MP05072-0002	22 -050	05072-0002
1A2MP05077-0022	14 -003	05077-0022
1A2MP05080-0006	15 -007	05080-0006
1A2MP05080-0020	14 -002	05080-0020
1A2MP05098-0002	21 -017	05098-0002
1A2MP05180-0001	12 -004	05180-0001
1A2MP05198-0001	19 -012	05198-0001
1A2MP05198-0002	19 -064	05198-0002
1A2MP05226-0001	18 -013	05226-0001
1A2MP05539-0009	28 -007	05539-0009
1A2MP05572-0003	17 -002	05572-0003-008
1A2MP10125	15 -008	10125
1A2MP1202-00	10 -039	1202-00
1A2MP1202-00	19 -085	1202-00
1A2MP1203-00	10 -034	1203-00
1A2MP1204-03	20 -035	1204-03
1A2MP201	29 -018	201
1A2MP29138	18 -029	29138
1A2MP29141	18 -025	29141
1A2MP29144	18 -028	29144
1A2MP29145	25 -006	29145
1A2MP30017	18 -005	30017
1A2MP30018	18 -008	30018
1A2MP30080	28 -018	30080
1A2MP30081	28 -017	30081
1A2MP30182	27 -040	30182
1A2MP30183	27 -041	30183

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1A2MP30261	27 -030	30261
1A2MP30262	27 -021	30262
1A2MP30294	24 -045	30294
1A2MP30305	24 -044	30305
1A2MP30329	15 -013	30329
1A2MP30361	24 -042	30361
1A2MP30363	15 -015	30363
1A2MP30388-0001	15 -024	30388-0001
1A2MP30389	15 -012	30389
1A2MP30394	29 -068	30394
1A2MP30400-0001	10 -050	30400-0001
1A2MP30400-0001	15 -000	30400-0001
1A2MP30456	27 -026	30456
1A2MP30458	27 -017	30458
1A2MP30472	18 -041	30472
1A2MP30577	21 -019	30577
1A2MP30620	03 -093	30620
1A2MP30660	22 -057	30660
1A2MP30661	22 -055	30661
1A2MP30673	21 -013	30673
1A2MP30675	21 -008	30675
1A2MP30677	21 -011	30677
1A2MP30686	27 -027	30686
1A2MP33024-0003	28 -000	33024-0003
1A2MP33032	10 -061	33032
1A2MP33032	26 -000	33032
1A2MP33131-0002	10 -060	33131-0002
1A2MP33131-0002	25 -000	33131-0002
1A2MP33131-0003	25 -000	33131-0003
1A2MP33131-0003	10 -060	33131-0003
1A2MP33225	22 -030	33225
1A2MP33372	21 -006	33372
1A2MP33379	22 -036	33379
1A2MP33381	22 -032	33381
1A2MP33384	20 -009	33384
1A2MP33384	22 -000	33384
1A2MP33621	20 -007	33621
1A2MP33810	10 -021	33810
1A2MP33813	10 -016	33813
1A2MP33863	10 -055	33863
1A2MP33864	10 -057	33864
1A2MP34250	29 -033	34250
1A2MP36086	27 -019	36086
1A2MP36334-0001	18 -030	36334-0001
1A2MP36335	18 -038	36335
1A2MP36336	18 -037	36336
1A2MP36337	18 -036	36337
1A2MP36344	18 -035	36344
1A2MP36345	18 -034	36345
1A2MP36373	19 -044	36373
1A2MP36573	13 -022	36573
1A2MP36579	13 -017	36579
1A2MP36581	13 -024	36581
1A2MP36592	13 -015	36592
1A2MP36594	10 -006	36594
1A2MP36594	12 -000	36594
1A2MP36598	12 -021	36598
1A2MP36601	12 -014	36601
1A2MP36602	12 -030	36602
1A2MP36603	12 -007	36603
1A2MP36604	12 -008	36604
1A2MP36606	12 -011	36606
1A2MP36610	12 -028	36610
1A2MP36612	12 -027	36612
1A2MP36615	12 -017	36615
1A2MP36616	12 -020	36616
1A2MP36665	12 -013	36665
1A2MP36667	12 -026	36667
1A2MP37141	28 -008	37141
1A2MP37432	10 -048	37432
1A2MP37433	27 -014	37433
1A2MP37453	19 -087	37453
1A2MP37455	19 -084	37455
1A2MP37456	19 -013	37456
1A2MP37457	19 -082	37457
1A2MP37458	19 -083	37458
1A2MP37482	24 -022	37482
1A2MP37495	20 -060	37495

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1A2MP37506	20 -024	37506
1A2MP37506	20 -044	37506
1A2MP37506	20 -046	37506
1A2MP37507	24 -021	37507
1A2MP37509	18 -022	37509
1A2MP37509	23 -015	37509
1A2MP37509	23 -027	37509
1A2MP37509	24 -009	37509
1A2MP37509	24 -020	37509
1A2MP37509	24 -025	37509
1A2MP37510	23 -019	37510
1A2MP37511	24 -031	37511
1A2MP37512	24 -017	37512
1A2MP37516	20 -054	37516
1A2MP37524	20 -020	37524
1A2MP37525	20 -042	37525
1A2MP37528	10 -012	37528
1A2MP37567	19 -056	37567
1A2MP37571	13 -016	37571
1A2MP37578	23 -021	37578
1A2MP37594	12 -005	37594
1A2MP37594	12 -019	37594
1A2MP37726	19 -011	37726
1A2MP37727	19 -091	37727
1A2MP37728	19 -080	37728
1A2MP37729	15 -020	37729
1A2MP37735	10 -059	37735
1A2MP37735	17 -000	37735
1A2MP37736-0001	10 -062	37736-0001
1A2MP37736-0001	27 -000	37736-0001
1A2MP37736-0002	10 -062	37736-0002
1A2MP37736-0002	27 -000	37736-0002
1A2MP37736-0003	10 -062	37736-0003
1A2MP37736-0003	27 -000	37736-0003
1A2MP37756	24 -013	37756
1A2MP37757	24 -012	37757
1A2MP37759	24 -010	37759
1A2MP37775	15 -009	37775
1A2MP37797	15 -011	37797
1A2MP37798	20 -027	37798
1A2MP37799	20 -043	37799
1A2MP37800	24 -014	37800
1A2MP37800	24 -028	37800
1A2MP37801	20 -048	37801
1A2MP37802	20 -026	37802
1A2MP37803	20 -029	37803
1A2MP37831	10 -030	37831
1A2MP37834	12 -016	37834
1A2MP37836	19 -004	37836
1A2MP37911	17 -017	37911
1A2MP37934	29 -054	37934
1A2MP37945	20 -017	37945
1A2MP37964	12 -009	37964
1A2MP37988	17 -004	37988
1A2MP37990	10 -027	37990
1A2MP37993	11 -014	37993
1A2MP38000	13 -008	38000
1A2MP38004	20 -038	38004
1A2MP38004	23 -042	38004
1A2MP38005	18 -039	38005
1A2MP38005	19 -059	38005
1A2MP38005	19 -077	38005
1A2MP38005	23 -001	38005
1A2MP38005	23 -024	38005
1A2MP38005	23 -031	38005
1A2MP38005	23 -050	38005
1A2MP38009	10 -041	38009
1A2MP38010	10 -040	38010
1A2MP38011	10 -047	38011
1A2MP38012	10 -032	38012
1A2MP38013	10 -031	38013
1A2MP38014	14 -001	38014
1A2MP38019	14 -007	38019
1A2MP38024	18 -049	38024
1A2MP38027	10 -043	38027
1A2MP38030	12 -029	38030
1A2MP38035	21 -004	38035
1A2MP38037	21 -009	38037

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1A2MP38039	21 -021	38039
1A2MP38065	20 -002	38065
1A2MP38065	21 -000	38065
1A2MP38073	14 -006	38073
1A2MP38074	14 -006	38074
1A2MP38084	12 -003	38084
1A2MP38085	12 -002	38085
1A2MP38093	10 -044	38093
1A2MP38094-0001	10 -049	38094-0001
1A2MP38094-0001	14 -000	38094-0001
1A2MP38094-0002	10 -049	38094-0002
1A2MP38094-0002	14 -000	38094-0002
1A2MP38095-0001	14 -005	38095-0001
1A2MP38095-0002	14 -005	38095-0002
1A2MP38096	13 -023	38096
1A2MP38097	17 -015	38097
1A2MP38098	17 -023	38098
1A2MP38098	19 -000	38098
1A2MP38099	19 -111	38099
1A2MP38099	20 -000	38099
1A2MP38100	20 -061	38100
1A2MP38100	23 -000	38100
1A2MP38100	24 -000	38100
1A2MP38101	19 -098	38101
1A2MP38102	19 -076	38102
1A2MP38103	19 -058	38103
1A2MP38104	20 -011	38104
1A2MP38105	20 -036	38105
1A2MP38106	23 -022	38106
1A2MP38107	23 -026	38107
1A2MP38108	23 -037	38108
1A2MP38109	24 -030	38109
1A2MP38110	24 -016	38110
1A2MP38111	23 -052	38111
1A2MP38111	24 -046	38111
1A2MP38112	10 -023	38112
1A2MP38113-0001	27 -064	38113-0001
1A2MP38113-0001	29 -000	38113-0001
1A2MP38113-0002	27 -064	38113-0002
1A2MP38113-0002	29 -000	38113-0002
1A2MP38113-0003	27 -064	38113-0003
1A2MP38113-0003	29 -000	38113-0003
1A2MP38114-0001	29 -098	38114-0001
1A2MP38114-0001	30 -000	38114-0001
1A2MP38114-0002	29 -098	38114-0002
1A2MP38114-0002	30 -000	38114-0002
1A2MP38114-0003	29 -098	38114-0003
1A2MP38114-0003	30 -000	38114-0003
1A2MP38141	10 -009	38141
1A2MP38147	10 -028	38147
1A2MP38147	13 -000	38147
1A2MP38162	11 -005	38162
1A2MP38163	11 -011	38163
1A2MP38164	10 -004	38164
1A2MP38164	11 -000	38164
1A2MP38204-0001	30 -031	38204-0001
1A2MP38204-0002	30 -031	38204-0002
1A2MP38204-0003	30 -031	38204-0003
1A2MP38241	19 -045	38241
1A2MP38242	18 -001	38242
1A2MP38243	17 -006	38243
1A2MP38243	18 -000	38243
1A2MP38244	19 -057	38244
1A2MP38246	19 -055	38246
1A2MP38248	18 -011	38248
1A2MP38249	18 -015	38249
1A2MP38261	16 -003	38261
1A2MP38262	10 -052	38262
1A2MP38262	16 -000	38262
1A2MP38301	19 -110	38301
1A2MP38305	29 -062	38305
1A2MP38306	20 -022	38306
1A2MP38310	17 -011	38310
1A2MP38311	17 -009	38311
1A2MP38399	30 -005	38399
1A2MP38400	30 -003	38400
1A2MP38406	19 -040	38406
1A2MP38434	10 -020	38434

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1A2MP38440	15 -016	38440
1A2MP38441	15 -023	38441
1A2MP38442	15 -021	38442
1A2MP38443	15 -022	38443
1A2MP38463	15 -017	38463
1A2MP38464	15 -019	38464
1A2MP38475-0001	32 -063	38475-0001
1A2MP38475-0002	32 -063	38475-0002
1A2MP38646	10 -003	38646
1A2MP38649	10 -002	38649
1A2MP38844	19 -047	38844
1A2MP38846	19 -049	38846
1A2MP38847	12 -006	38847
1A2MP38849	10 -013	38849
1A2MP38853	20 -021	38853
1A2MP38854	20 -043	38854
1A2MP38864	27 -038	38864
1A2MP39025	27 -046	39025
1A2MP39026	27 -043	39026
1A2MP39027	27 -034	39027
1A2MP50 FA 440	13 -021	50 FA 440
1A2MP50 FA 440	29 -075	50 FA 440
1A2MP50FK632	23 -014	50 FK 632
1A2MP5100-25	27 -056	5100-25
1A2MP5100-34	23 -039	5100-34
1A2MP5100-34	29 -037	5100-34
1A2MP5100-34	29 -044	5100-34
1A2MP5100-34	29 -051	5100-34
1A2MP5100-34	29 -059	5100-34
1A2MP5100-34	29 -083	5100-34
1A2MP5100-34	29 -090	5100-34
1A2MP5103-18	25 -009	5103-18
1A2MP5103-50	25 -025	5103-50
1A2MP5133-12	12 -010	5133-12
1A2MP5133-12	12 -018	5133-12
1A2MP5133-12	15 -010	5133-12
1A2MP5133-12	18 -020	5133-12
1A2MP5133-12	20 -012	5133-12
1A2MP5133-12	20 -023	5133-12
1A2MP5133-12	20 -025	5133-12
1A2MP5133-12	20 -037	5133-12
1A2MP5133-12	20 -045	5133-12
1A2MP5133-12	20 -047	5133-12
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1A4MP00632	03 -066	00632
1A4MP00648	05 -003	00648
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1A4MP00660	05 -002	00660
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1A4MP00882	03 -114	00882
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1A4MP00889	03 -121	00889
1A4MP00890	03 -122	00890
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1A4MP00932	03 -159	00932
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